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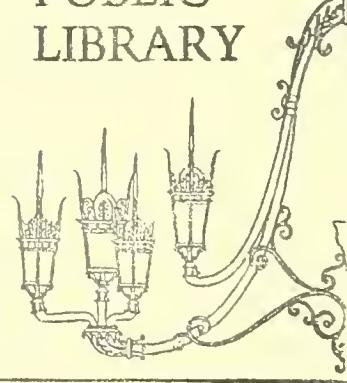
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MASSACHUSETTS IN PERSPECTIVE

This publication is produced for the Commonwealth of Massachusetts, Michael S. Dukakis, Governor; Thomas P. O'Neill III, Lt. Governor; the Secretary of Economic Affairs, Howard N. Smith; and the Department of Commerce and Development, John J. Marino, Commissioner.

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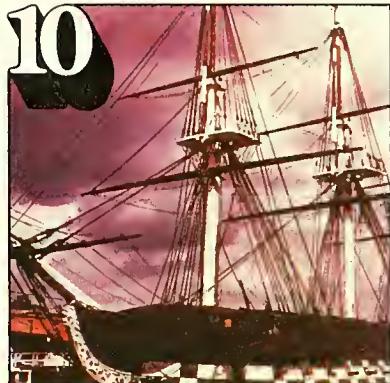
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Points of View



The Edge



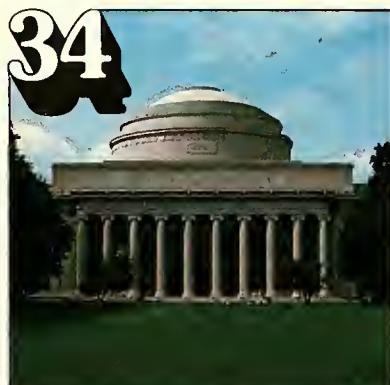
Our History Lives Today



The Hard Questions



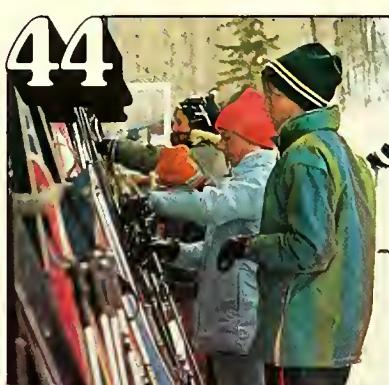
The Professional Environment



Where High Technology Grows



The International Connection



Enjoying Life in Massachusetts



The Quality of Life



MICHAEL S. DUKAKIS
GOVERNOR

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE • BOSTON 02133

The dramatic improvement in the fiscal and economic climate of Massachusetts over the past two years is an encouraging sign for the future.

We've changed the face of Massachusetts government. The budget is balanced. The state's debt has been sensibly restructured. And implementation of the recommendations of the Management Task Force is steadily improving services, saving money, and making state agencies more responsive.

Our Economic Development Program—a first for Massachusetts—has provided a coherent blueprint for economic growth in the Commonwealth.

Central to that program is our decision to help Massachusetts-based industry grow within the Commonwealth. This year we are expanding the state's innovative financial assistance agencies whose sole purpose is to help local businesses grow. And a series of regional economic development conferences and the business contact program have improved government's communication with business and labor leaders.

Our policy of concentrating state funds in older urban areas is attracting new private investment into our cities. People are recognizing that these cities provide a readily available workforce, an array of public services and reusable commercial, industrial and residential space at a fraction of the cost of new buildings.

In June 1975 Massachusetts had an unemployment rate of 12%, four points higher than the national rate. Today, 90,000 more people are at work in Massachusetts than there were two years ago, and our unemployment rate of 6.8% is lower than the national average for the first time in six years. But, 6.8% is still a figure we must improve on.

While we have reversed the don't-expand-in-Massachusetts trend of recent years and a growing number of firms are saying they like what they see here, there is still an awful lot of work left to do.

Preface

Massachusetts is a special place. No other state can claim similar depth and diversity of political, cultural, intellectual and social contributions to the founding and growth of our nation.

Massachusetts continues to be a leader. In manufacturing, banking, medicine, agriculture, education, architecture, electronics and the arts Massachusetts still sets a standard of excellence.

Let us explain why Massachusetts is exceptional.

We want to show both the strengths and weaknesses of the state. We want to give you a sense of the environment the Commonwealth provides—an environment conducive to the creation and growth of great ideas and great people. We want to show you a state in which a mixture of ethnic heritage guarantees diversity.

We have tried to bring some "Yankee candor" to this effort, including interviews and quotations to support our evaluations. Facts are facts. We want them presented clearly and fairly.

In graphs and tables we have made direct comparisons with other states and urban centers. These states were chosen because they are similar to Massachusetts in industrial orientation, or because they have a concentration of high technology. They are our major competitors in these fields. Throughout this book we try to convey a feeling and appreciation for those aspects of Massachusetts that escape direct measurement. Massachusetts exceeds the dimensions of text, photographs, and graphs; yet through them we hope you will come to know us better. The men and women featured in the first section are only a few of the many who have shared their personal experiences with us saying, in one way or another, that for them Massachusetts is the right place to live and do business.

Points of View



American Pacemaker Corporation
Woburn, Massachusetts
Ralph E. Hanson, President

The pacemaker industry has changed dramatically in the past 18 months due to the acceptance of lithium batteries as a power source. This enables the patient over his remaining life span to endure less replacements because of the increased longevity of the power source. The heart pacemaker market is presently a \$270 million world-wide industry with growth forecasted to be \$500 to \$600 million by 1980.

With regard to APC, we are the only pacemaker company located in the northeast region of the USA. We feel this is an outstanding asset for Massachusetts offers not only high technological, educational and medical research resources but a government that cares. As a small business in the formative stages of development, Federal and State government representatives and agencies played a major role in helping APC to establish themselves in the community.

Sperry-Univac Research Center
Sudbury, Massachusetts
Dr. Richard H. Fuller, General Manager

We are here by conscious choice. Being the corporate research center for Sperry-Rand, which is national and located in many places in the United States, we had the choice of siting the research center in any locale in the country. We looked over many on the West Coast, and several on the East Coast, and chose the Boston environment.

We recognized that there was a skilled labor pool here and that there was a greater availability of scientific information, the university libraries, university consulting and some private industry consultants. We can conveniently get to any place from Logan Airport. The quality of life offered to employees was important. All these advantages are still operating today. Massachusetts is clearly one of the very best locations in the country. There are many things that our people find attractive about the area: excellent opportunities for continued professional growth, taking courses at local universities and teaching in those universities, strong professional society activities. Within the universities and the government laboratories there are many opportunities to discuss technical problems. It is further true that we, by charter, are the eyes of the corporation on the technical community at large, so that we are able to serve in an information gathering role for the entire corporation, and put this into context significantly with the scientific community within Massachusetts.



Mobil Tyco Solar Energy Corporation
Waltham, Massachusetts
Dr. A. I. Mlavsky, Executive Vice President

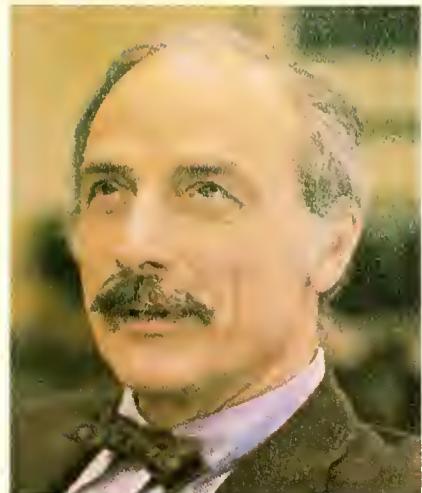
Right now, this is the place to be for research, unequivocally. But it is expensive to live in Massachusetts. Cutting costs, of course, is very important to all of us. We have to expend power to make devices to produce or store power, and it is not infrequent that a high proportion of the cost relates to the cost of power you have to put into the process. To the extent you are talking about a process that is mechanized heavily, organized heavily, where the skills are mainly engineering skills rather than involving large work forces, I think we still come out in favor of Massachusetts. If you come to the stage where your product is largely labor force intensive, then you really have to wonder a little bit. I don't know.

POLAROID CORPORATION
Cambridge, Massachusetts
Mr. William McCune, Jr., President

"Ours is a high technology business with interaction between research, engineering and manufacturing. Usually new products are first produced in our facilities in Massachusetts.

"If we were making products such as paper or iron and steel there are other parts of the world closer to the needed raw materials that would be advantageous locations. But we are a high technology company. We find the environment here attractive and most of the people who come here find it attractive as well. We are near a variety of excellent educational institutions. Because of these educational institutions there is a constant influx of young people who keep things stirred up. We don't have the rigid, starchy environment one finds in many places. Ours keeps us alive; keeps us re-evaluating our attitudes. This is invigorating and productive.

"In addition, it is easy for those of us who want some extra training or education to acquire it in the area. I was trained as an engineer. However, in the early 1950's I found that dealing with organic chemistry was difficult because it hadn't been part of my education and I didn't understand the language. So a fellow engineer and I enrolled for organic chemistry at MIT where we could walk across the street to our daily class and then back to work again."



Dureco Corporation
Boston, Massachusetts 02109
B. J. Stoeckeler, President

It's people who are "Doers", not "Talkers" . . . positive people with imagination, personal integrity and good old "Yankee Ingenuity", from scientists, craftsmen, engineers, assembly-line workers, small business men, management, and the financial community who want to help you make that "Crazy Concept", the technical breakthrough, become reality. It seems like everyone's been "Involved", directly or indirectly with research and development or high technology oriented companies, and they are all pulling for you to become the next "DEC" or "Polaroid" . . . because of the critical nature of our product lines, the integrity of the work force is vital to maintaining the quality of those products . . .



Wang Laboratories, Inc.
Tewksbury, Massachusetts
Dr. An Wang, President

"Wang Laboratories is a major worldwide manufacturer of small computer and word processing systems. I attribute much of our company's success to the skill and industriousness of our employees, most of whom live and work in Massachusetts. Massachusetts offers a good environment in which Wang Laboratories can continue to grow."





Joan Fabrics, Inc.
Lowell, Massachusetts
Mr. Lawrence Ansin, President

Communities like Fall River, New Bedford, Lowell and Lawrence are excellent communities for business expansion and growth. There is an abundance of employable help. Our performance in Lowell and Fall River has been excellent in regard to available labor. Our labor turnover on an annual basis is under 4%, which we feel is very, very good.

Property for growth or expansion is available at reasonable prices. In Lowell we just purchased an old industrial building for \$1.50 per square foot and renovated it for another \$2.00 per square foot. If we had to build that same structure from scratch, we would have to pay approximately \$16.00 a square foot.

The cost of energy is a small part of our total business expenditure.

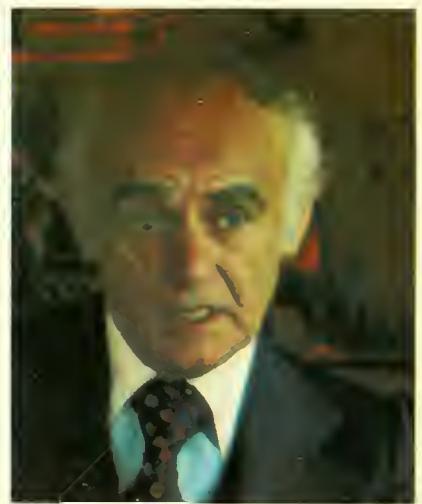
In 1954 we purchased a plant in Hickory, North Carolina because of the availability of labor, and what we thought at the time was cheaper labor. Today the wage rate we pay in Hickory is comparable to the wage rate we pay in Massachusetts. The availability of labor in Hickory is under 1% so that it is not only the rate you pay that has no differential, but the availability of labor.

No places in the United States have a better labor pool available or such good manufacturing real estate than the old Massachusetts industrial cities.

Massachusetts has a lot to offer textile and textile related industries.

Anthony's Pier Four
Boston, Massachusetts
Mr. Anthony Athanas, President

We are in an area which is very vital, very dynamic for my industry and no matter how much talent one may have in developing one's business, it must be conducive to the area. We are one of the largest restaurants in the world in the number of guests that come here. Over three-quarters of a million people go through these doors every year, and we are increasing all the time. We're not in a desert here, our outstanding universities, hospitals, industries and other renowned factors attest to Greater Boston's international repertoire. Having this kind of an atmosphere here is really what has contributed tremendously to the growth of my business, and Boston's restaurant industry. Since Anthony's Pier Four was established in 1963, I think something like fifteen or twenty other restaurants have grown up near us. I just love this area. My four sons, who are in business with me, also love this area and would be most reluctant to leave it— they range in age from 25 to 35.



Analog Devices, Inc.
Norwood, Massachusetts
Mr. Ray Stata, President

One of the greatest strengths Massachusetts has to offer to a high technology business is the availability of industrious and talented human resources. Since we are one of the world's leading producers of highly sophisticated electronic devices and systems used in precision measurement and computerized control, the natural human resources of Massachusetts are essential to our success. I know that we will continue to expand our facilities in Massachusetts because of the proximity of academic and research centers engaged in exploring the frontiers of medicine, industrial automation, navigation and avionics. Our company profits from being in this environment where the "state-of-the-art" is happening. We also are able to utilize technicians schooled and skilled in the sophisticated software and hardware used in these technologies. We have also witnessed Massachusetts taking steps to create a sounder base for economic development. This helps us as it helps other related industries in the area. We are very optimistic about our future in Massachusetts and the electronic industry.

Strathmore Paper Co.
Westfield, Massachusetts
Mr. John Gallup, President

Massachusetts is an area in which the Strathmore Paper Company is comfortable and well-known. Our roots here are deep, going back to our founding in 1892—

85 years ago.

The livability of our communities, the quality of our people, our proximity to transportation facilities—all of the conventional yardsticks—are impressive.

And I am not looking through rose-colored glasses when I say Strathmore regards itself as the beneficiary of a relatively favorable tax base . . . the combination of state taxes and local property taxes. It is true that these taxes have gone up, but they have not gone up in proportion to our growth; that is, as a percentage of our total sales, taxes have remained no higher . . . they are perhaps a little lower.

Because our taxes in relation to our growth have been relatively static, we have been able to invest more heavily in the region than we would have otherwise. At our Westfield plant, for example, we have in the past five years invested \$3 million in plant improvement and equipment.

Our plans presently call for expansion here to cater to an expanding market. We have, as I mentioned, all of the advantages that we need to capitalize on that opportunity.



Balfour Co.
Attleboro, Massachusetts
Mr. James Cook, President

There are obviously long-rooted traditions of the importance of education here, and I think teachers, administrators and parents take education seriously. Not that they don't in other places in the country, but I think that it is just a little extra seriously here. I found for example in the South, while our real estate taxes were a lot less, we ended up putting our three children in a private church school, so the cost of it was equal to what I was paying in Massachusetts property taxes, except it wasn't deductible on my federal tax return. In Pennsylvania, there was an income tax in the borough and in the county to pay for schools. And there are other kinds of taxes on a different basis.

The variety in mountain and shore within a short drive, the feeling of the heritage, I guess, the history, a sense of continuum the past to the future that's in this area is exciting. It's an ambiance, I guess, that we missed in other parts of the country and were very glad to come back. It's little things, for example, when we came back after being away for ten years just to see stone walls makes you feel good. I think the excitement of New England, its diversity, the willingness to be in the forefront of things, culturally as well as from a recreational point of view, creates a very stimulating lifestyle.



Compugraphic Corporation
Wilmington, Massachusetts
Carl Dantas, President

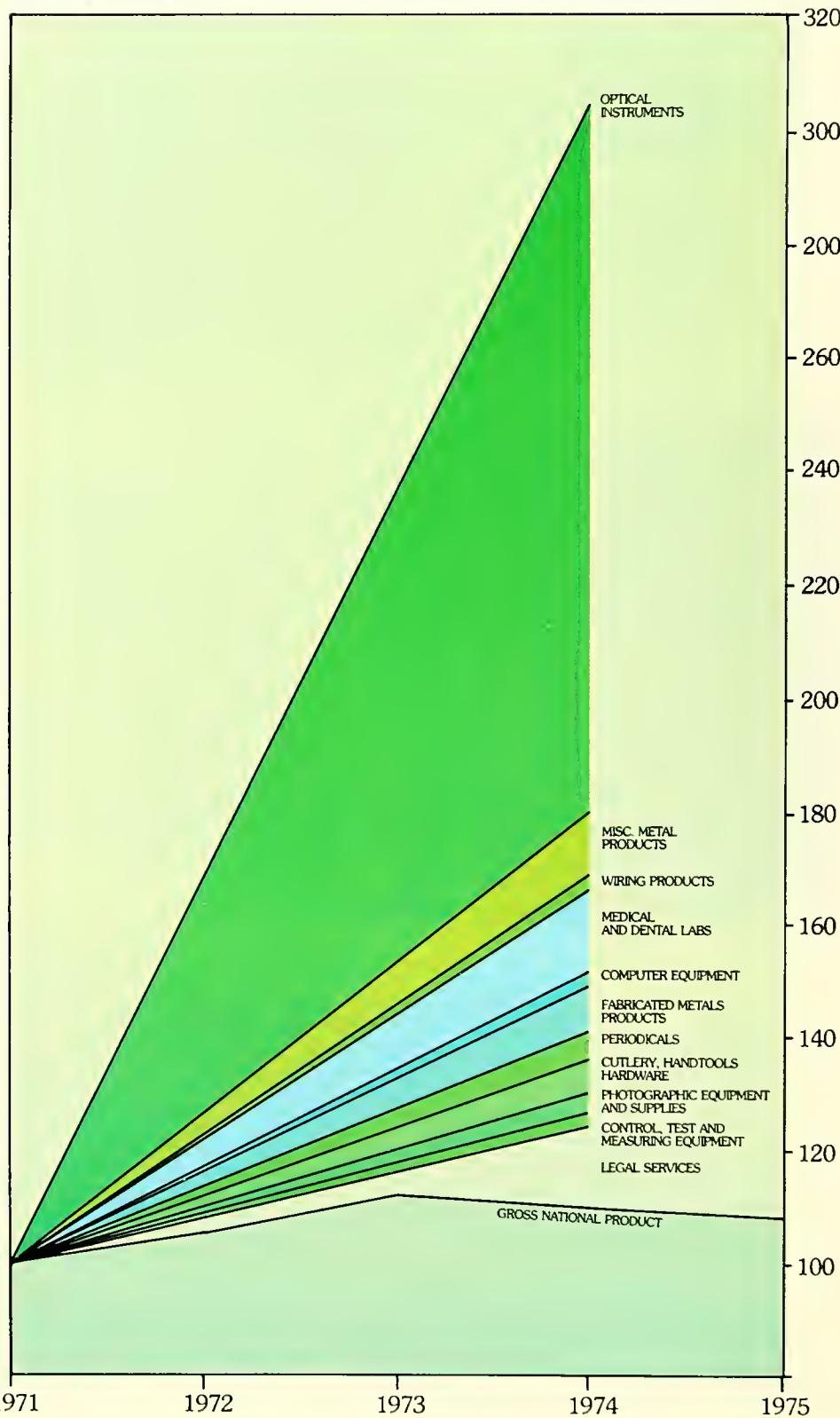
Compugraphic is the world leader in the development and manufacture of phototypesetting systems and accessories for the Publishing and Graphic Arts Markets. Over the past 8 years, our sales have grown from 3.6 million to over 95 million. This dynamic growth can be attributed to the talented and enterprising individuals whom we employ and who are available in Massachusetts.

The State has begun to show a positive and responsible attitude toward the business community. Also, the State is beginning to develop programs to achieve greater fiscal responsibility. A continuation of these positive changes will result in a better business environment which, in turn, will lead to the creation of more jobs for the people of Massachusetts.



- GNP: DOLLARS
- INDUSTRY SECTORS:
EMPLOYMENT
- ALL VALUES INDEXED:
1971 = 100

THE LEADING GROWTH SECTORS IN MASSACHUSETTS



The preceding interviews show that certain types of companies do exceptionally well in Massachusetts. Actual growth figures confirm that contention. There is a standard industrial classification (S.I.C.) system which groups companies together into sectors according to the type of business they are engaged in. By using this system we can look at growth statistics for whole sectors rather than individual companies. The graph shows some specific sectors in Massachusetts that have experienced outstanding growth. To show these results more clearly, the graph compares total increases in employment between 1971 and 1974 for these sectors with the growth in gross national product.

For example, the sector of Electronic Computing Equipment, which includes such major companies as Digital Equipment Corp., Analog Devices, Data General, Honeywell, Inforex, Teledyne, and Wang, had an average annual employment growth rate of about 15 percent. The sector of Measuring and Controlling Instruments, which has such companies as General Electric, General Radio, Foxboro, and Itek, grew by almost 9 percent each year over this period. The sector of Lighting and Wiring, with such companies as GTE Sylvania, Phillips, General Electric, and Borden, increased over 16 percent per year, and Optical Instruments and Lenses, comprising

such companies as Galileo Electro, Instrumentation Lab, and Kollmorgen, reports a phenomenal 39 percent average annual employment growth.

These sectors were selected for their outstanding records to show that certain types of companies have a definite advantage in Massachusetts, but they also demonstrate another fact that we wish to emphasize. In Massachusetts, high growth companies generally are the high technology ones. They are the industries that produce high value products and require a disproportionate amount of research, engineering, and highly skilled labor.



Minicomputers

Within the \$20 billion computer industry the fastest growing area is the minicomputer. Like so many other new ideas in advanced technology, this one was conceived in a university laboratory and developed into a major industry, all in Massachusetts. The idea began with Kenneth H. Olsen, an engineer who left MIT in 1958 to form Digital Equipment Corporation, which has since become a \$2 billion industry that has dramatically expanded the way computers are used. DEC is the largest of the minicomputer makers with a 37 percent share of the market and a current growth rate of 50 percent. Revenues of \$188 million in 1972 climbed to \$534 million in 1975 and are expected to reach one billion dollars in 1977. In addition to DEC, other leading minicomputer makers—Data General, Wang, Honeywell, and Analog Devices—are also located in Massachusetts. Data General, a strong competitor in this fast moving field, has recently made a major commitment to the manufacturing of the even smaller microprocessors that soon will be in every car, cash register, and telephone. There are, of course, many factors responsible for the phenomenal growth of the minicomputer industry,

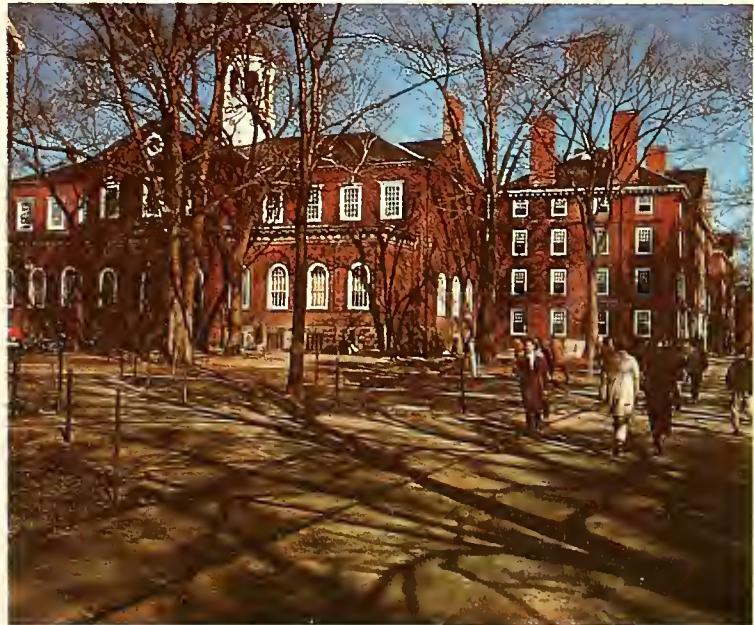
and we don't claim that the Massachusetts location was the most important one. But the idea and technical knowledge came from a Massachusetts university.

The venture capital that got DEC started came from the Boston firm of American Research and Development Corporation, which has helped finance many high technology ventures. And the management skills came from Massachusetts. Resources like these can't hurt you.

The reasons for the definite edge that many companies find in Massachusetts are examined in later sections, but the first to come up in many discussions is that tradition of innovation and achievement so famous in Massachusetts' history.



Our History Lives Today



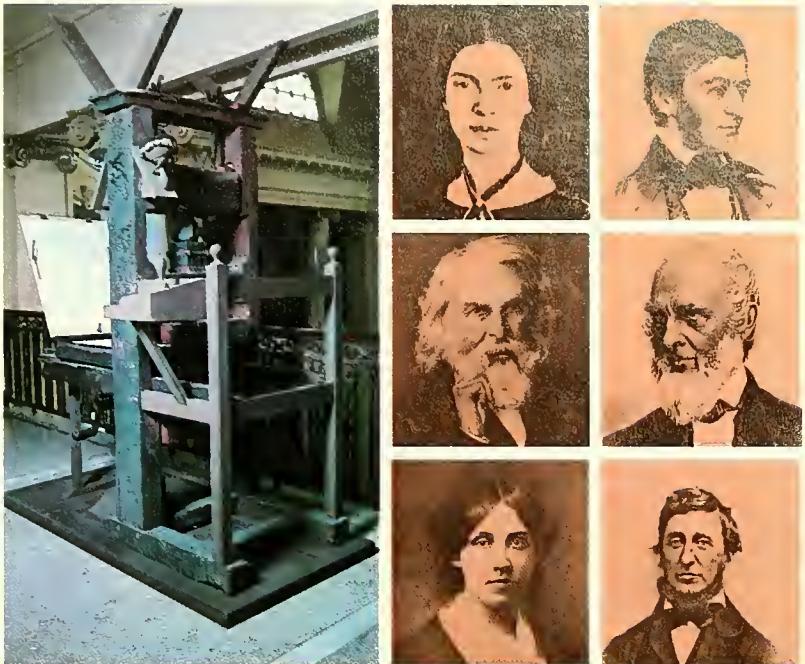
The historical accomplishments of Massachusetts are impressive by any measure, but their real importance lies in the fact that they are a coherent body of precedents that created the present and influence the future. Thus, to talk of the past and enumerate former achievements is much more than an exercise in pride and self-flattery. It tells us how we reached today, and what direction is tomorrow. From a very long list of things that happened first in Massachusetts we have chosen to mention here those still prominent today, for we feel that they best reflect the continuity and the flow of that tradition.

Education

The name Massachusetts is synonymous with excellence in education. And the strength of the system, both public and private, goes back three centuries to the educational leadership of the Puritan settlement. Boston Latin School, the first public school in America, was established here in 1635, and is still one of Boston's outstanding high schools. Massachusetts had the first tax-supported school system with a 1647 law requiring all towns having more than 50 families to hire and pay teachers of reading and writing. It also had the first board of education, and the first compulsory school attendance law. Local control of school systems is still an important feature of public education in Massachusetts. Massachusetts introduced the first training school for teachers, the first state school for the retarded, and the Perkins School, which was the country's first, and is still an outstanding, school for the blind. Harvard was the nation's first college in 1636, and remained the only one for 57 years. Today there are over 120 institutions of higher learning in Massachusetts, including some of the most prestigious in the world.

Literature

Along with the tradition of education in Massachusetts is the tradition of literature. Books on American history began with William Bradford's *History of Plimoth Plantation* in 1681, and continued through the writings of John Adams, William Prescott, George Bancroft, and on into this century with Samuel Elliot Morrison, Archibald McLeish, Arthur M. Schlesinger, Jr., and William H. White. Noah Webster's dictionary and the first American novel were published in Massachusetts. Emerson, Thoreau, Hawthorne, and Melville were all Massachusetts writers, as were the Pulitzer prize winners Oscar Handlin, Henry Adams, Henry James, John Marquand, and Robert Frost. The first printing press in America was in Cambridge in 1639, and the first three newspapers were all published in Boston, although the first, *Publick Occurrences*, was suppressed after four days by the British. With this tradition then, it was no accident that the City of Boston was the first to establish an entirely tax-supported public library in the mid-nineteenth century.



Government

The roots of American democratic institutions are found in the Mayflower Compact and the town meeting form of government which began in Massachusetts. The Massachusetts State Constitution, ratified in 1780, is the oldest state constitution still in force, and along with others served as the model for the Federal Constitution of 1789. Throughout the nineteenth century Massachusetts state government was a pioneer in the adoption of laws and in the creation of agencies to deal with the needs of an emerging industrial society. Massachusetts established the first Railroad Commission, the first Board of Health, the first Bureau of Labor Statistics, and the first minimum wage bill. Massachusetts was also one of the first to adopt laws providing for social services such as the first Department of Mental Health, and registration systems for medicine, dentistry, and pharmacy, as well as food and drug inspection, insurance and banking regulation, and arbitration mechanisms in labor disputes. Massachusetts continues this tradition today by pioneering in such areas as environmental protection and no-fault automobile insurance.

Industry

Massachusetts' place in the forefront of technical leadership and industrial innovation has been firmly established by a long list of firsts. Its continuing vitality has been documented throughout this publication. These developments and inventions generated many businesses and companies that are still alive and thriving today; businesses that are actively creating the contemporary atmosphere that will make possible tomorrow's technology.

For example, the U.S.S. Constitution—Old Ironsides—was built in Boston in 1794. Since then, advances in shipbuilding have poured out of Massachusetts yards. In the mid-1800's the fastest and most beautiful sailing ships of all time were being built in East Boston by Donald McKay. His most famous clipper, the Flying Cloud, set a sailing time between Boston and San Francisco that has never been equaled. During World War II, General Dynamics built 227 warships at the Fore River Shipyard in Quincy. After the war, the S.S. Constitution, the S.S. Independence, and the first U.S. nuclear powered missile cruiser have come off the ways at Quincy. Currently, the shipyard is building liquid natural gas tankers, probably the most technologically advanced ships in the world.

A metal fabricating industry that continues today, was started in 1643 with the establishment of the first



ironworks at Saugus. In 1888, Charles Morgan built the first machinery for a continuous steel rolling mill, and started a company that is still a major factor in the field today. The Norton Company, one of the world's largest in abrasives, began when Charles Norton developed the first cylindrical grinding machine in 1900 and revolutionized the metalworking industry. Worcester also saw the first American telegraph wire, the first insulated electrical wire, the first piano wire, and is still a major center in the field of wire production. The Morse Twist Drill Company is still doing a large business one hundred and fourteen years after Stephen Morse patented the first twist drill bit in New England.

The American textile industry was literally born and raised in Massachusetts in the great mills of Lowell, Lawrence, and nearby towns. Developments contributing to this growth continued through a great number of firsts in the development of textile machinery, but also expanded into the clothing industry with Elias Howe's sewing machine. While the textile industry has diminished, the clothing industry is still flourishing in Massachusetts and accounts for a large employment.

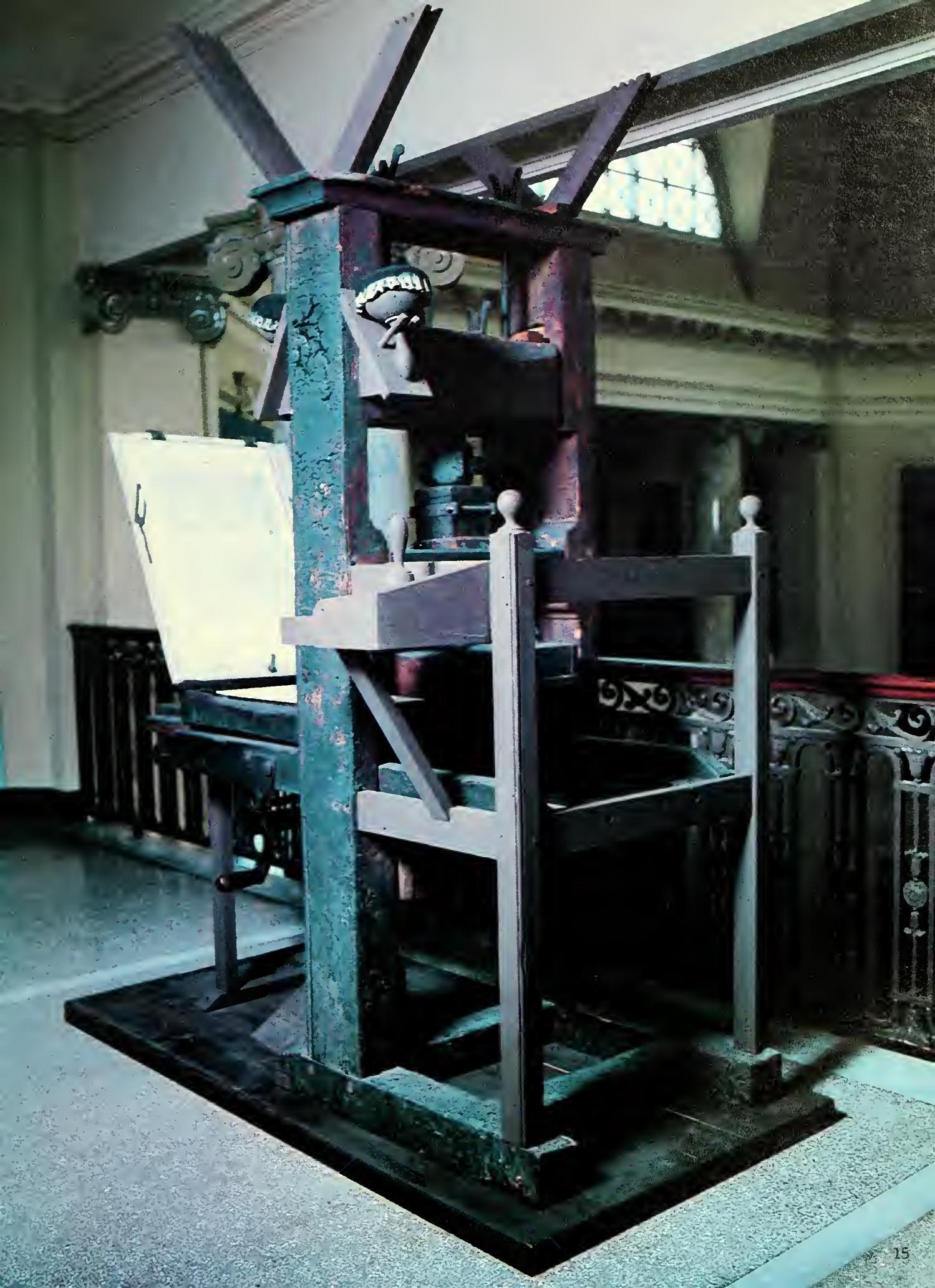
These industries are but a small sample of the many that started in Massachusetts and are still operating today. In a little less detail here are a few more typical examples of pioneering Massachusetts companies.

The first newsprint manufactured in this country from wood pulp was made in 1867 by what is now the Jones Division of the Beloit Corporation. In 1903, King Gillette invented the first safety razor, and the Gillette Company today is one of the principal manufacturing establishments in Boston. The American eyeglass industry was founded in 1833 by William Beecher in Southbridge, Massachusetts. The company is now the American Optical Company in Massachusetts and is one of the leaders in the field. Charles Goodyear discovered the process of vulcanizing rubber in Massachusetts in 1839, and Massachusetts is still a major factor in the rubber goods industry, particularly in footwear and rainwear. Boston was the site of Alexander Graham Bell's great invention. The first electrical power transformer was invented in Great Barrington, Massachusetts by William Stanley, and the company he founded is now part of General Electric of Pittsfield and part of General Electric's wide manufacturing interests.

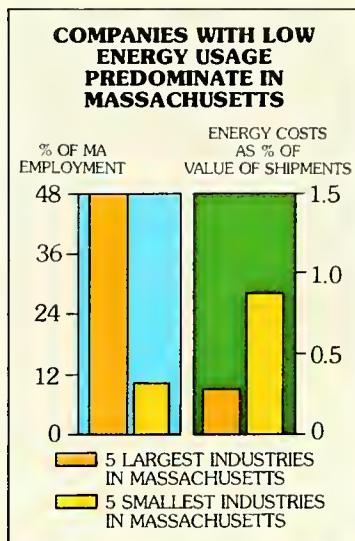
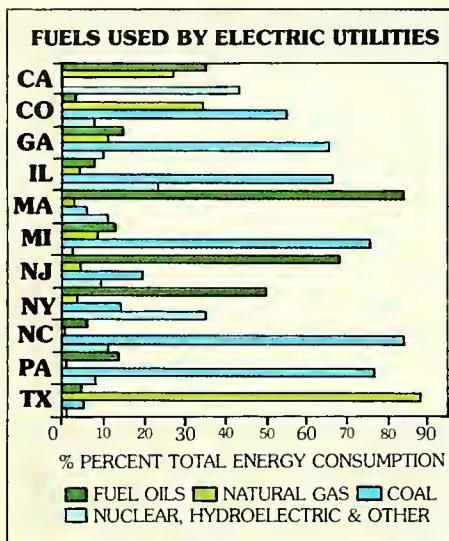
The list could go on and on, but one fact stands out: the same type of things that happened one hundred, two hundred, and three hundred years ago in Massachusetts are still happening today. The spirit and tradition of innovation that started and maintained whole industries over the years is still present in Massachusetts and promises the same continuity into the future.







The Hard Questions



This section addresses the economic facts of life. There are some questions that must be asked, and answered, because they affect everyone—individuals, families, and businesses. The subjects of taxes, transportation, fuel costs, labor, and financial resources are dealt with candidly and without apology. We are very proud of some of the answers; others we are working to change.

Energy

Energy costs are high in Massachusetts and have risen sharply in the last few years. The reason is largely the high dependence of New England on fuel oil. Besides what is used for heating, 80 percent of our electricity is generated using fuel oil, so the oil price crunch hit us harder than most. The relative importance of energy usage in your business will determine how you view this fact. Although the cost of energy affects everyone, it is particularly critical to those sectors where fuel or power is a significant part of the production budget. In a situation of high energy costs, industries that tend to be low energy users would have a distinct advantage over high energy users. In order to determine if Massachusetts' industries differ in this respect we looked at the relative energy usage across different manufacturing sectors. Five sectors—electronic equipment, machinery, apparel, fabricated metal products, and printing/publishing, which are the largest in terms of number of employees in Massachusetts, were compared with five other sectors, lumber and wood products, furniture, stone/clay/glass, chemicals, and primary metals, which are smallest in terms of the number of employees. The first group of five sectors accounts for almost half of the total manufacturing employment, while the second group accounts for only about 10 percent of the labor force. Two main points emerged from this comparison. First, we found that industry sectors which have the most employees used only $\frac{1}{3}$ as much energy for the same amount of finished goods as the five sectors with the fewest employees. Second, we found that, generally, industries with the lowest energy requirements tend to concentrate far more in Massachusetts than they do in other parts of the United States.

State Identification Codes

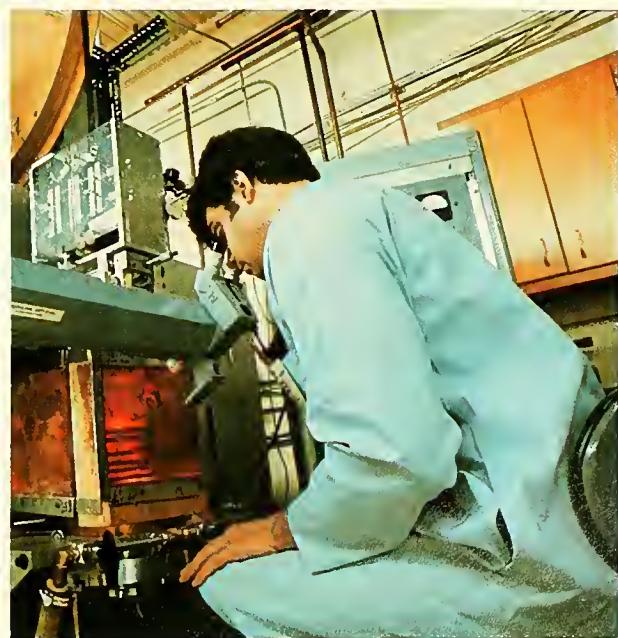
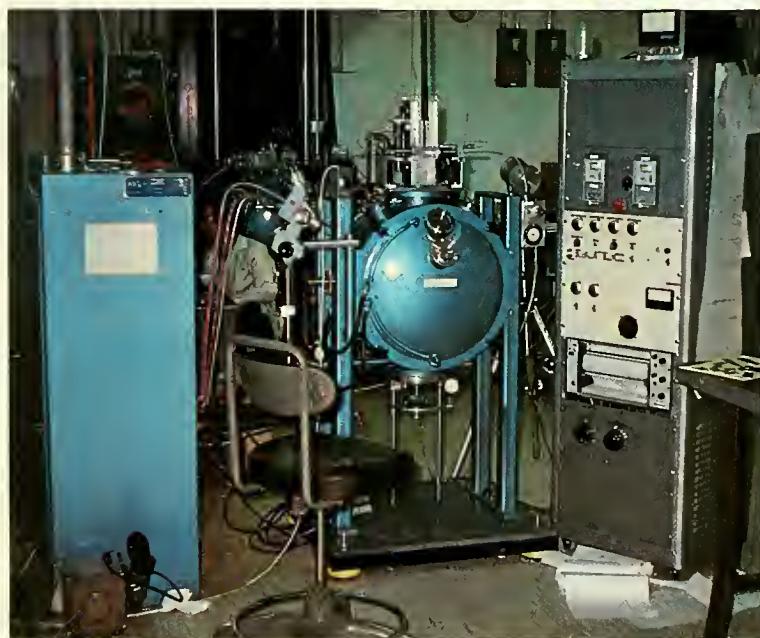
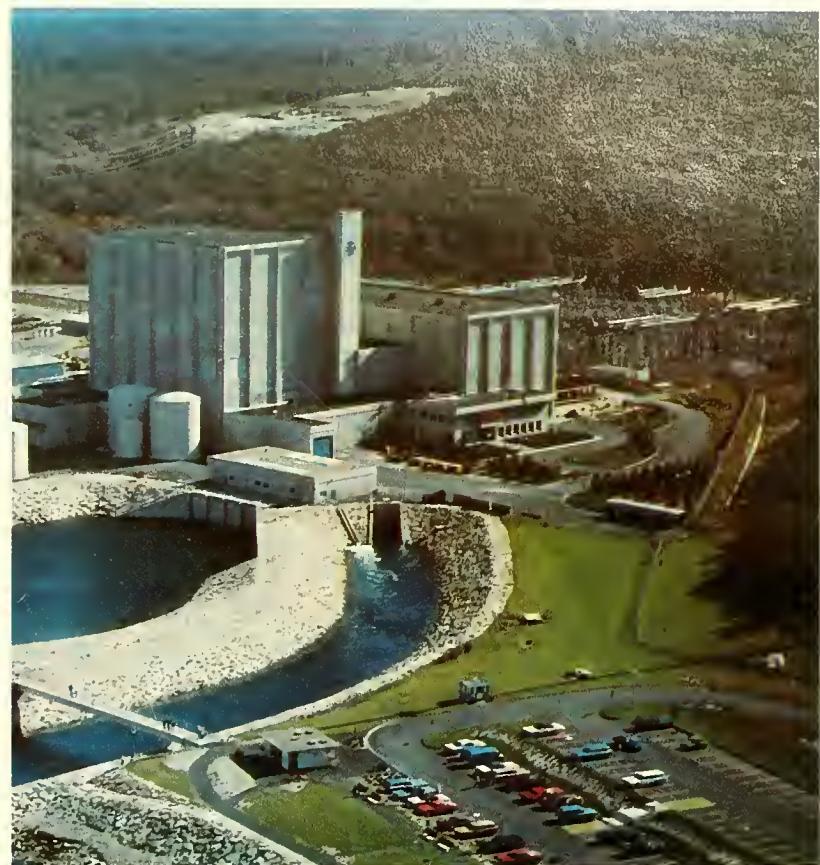
CA —California	MA —Massachusetts	NY —New York
CO —Colorado	MI —Michigan	PA —Pennsylvania
GA —Georgia	NC —North Carolina	TX —Texas
IL —Illinois	NJ —New Jersey	

(use for further state code reference)

The high cost of energy is something we have all become too familiar with. Extracting energy from sunlight would seem to be a low cost solution because there is no costly fuel consumption. The silicon solar cell, simple, efficient, almost indestructible, and made of abundant material, can convert the energy of the sun directly into electricity. However, up until now the production costs of making silicon in the size and purity needed have been very high. Mobil Oil Corporation has invested \$50 million in Massachusetts' Tyco Labs technology to develop a process to produce low cost silicon crystals. Their process will make silicon in continuous ribbons up to 500 feet long and about the thickness of a hair. Mobil Tyco Executive Vice President, Dr. Abraham Mlavsky says his company is aiming for a 4,000 percent decrease in costs – from \$20,000 per kilowatt now, to \$500 per kilowatt. At this level solar cells would be competitive in capital cost to other forms of energy generation.

Dr. Mlavsky credits the availability of academic scientific expertise, particularly at Harvard University, as a critical factor in the development of the process.

Reflecting on his own company's experience, Dr. Mlavsky says, "I am sure that one of the reasons there are so many high technology companies in Massachusetts is that it is difficult to come across a problem you can't get some help with in this area."



Transportation



Massachusetts is very fortunate in having a well balanced, quality transportation network that makes it easy to move people and products. Although we are geographically one of the smallest states in the nation, we have proportionally more interstate highway than any other state. Our road system contains over 31,000 miles of paved and surfaced roadway, giving us more roads per square mile than any of the eleven states, except New Jersey. In mass transit, Boston, which had the nation's first subway system in 1897, was ranked the best of all major urban systems in 1976 by a New York based research organization, the Council on Municipal Performance. This study, the only comprehensive one of its kind, examined 28 major American urban transportation systems for overall performance, as well as several economic and service factors.

There are 131 public and private airports in the state (a higher density than all but New Jersey), and a pilot is never more than 17 miles from a paved, lighted runway. Logan Airport is unique among all major airports in the world in terms of its accessibility to the central business district. Downtown Boston is 10 minutes from Logan and the whole Metropolitan area of some two and a half million people is within 40 minutes of the airplane loading ramps. The easy accessibility to airports is one of the reasons that Massachusetts ranks sixth in domestic boardings and fourth in international boardings. Logan Airport is one of the major transportation entities administered by the Massachusetts Port Authority (Massport).



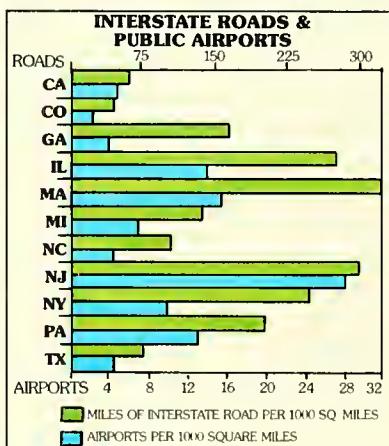
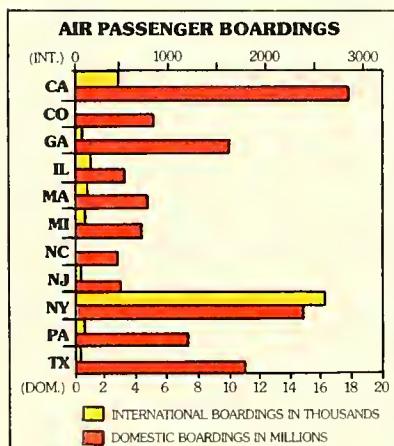
Mr. Richard Hebert, Manager
Armco Steel Corporation
Palmer, Massachusetts

In Massachusetts we happen to be centrally located for our business. All of our product is trucked. We maintain our own fleet of trucks. Here in Palmer we are centrally located off the Massachusetts Turnpike. We are right in an excellent location, with access to all the major highways and all the major thruways in this area. This has also contributed to the fact that we closed our plants in White River Junction, Vermont and Portland, Maine. It was so easy for us to distribute from this plant in Palmer that the operations in White River Junction and Portland have now been moved into this plant. It is so easy to get to our markets from here.



Mr. James Shea, President
Milton Bradley, Inc.
East Longmeadow, Massachusetts

We had an opportunity when we built the new plant in East Longmeadow to locate in virtually any part of the country we wanted. But we elected to stay in the state of Massachusetts. We have enjoyed a 117-year history in Massachusetts, specifically in the Springfield area. The positive reasons for remaining here include a good labor force, excellent professional skills, the availability of raw materials. Within roughly a three-hundred to four-hundred mile radius we cover about one third of our commercial market.



Massport

Massachusetts has always been one of the great trading centers of the nation and the Port of Boston has figured in many political and economic events down through the years. British restrictions on colonial trade resulted in a harbor full of tea in 1773. After the Revolutionary War, foreign commerce increased dramatically and shipbuilding became an important industry. We have already mentioned the magnificent clipper ships, such as the Flying Cloud, that were being built in Boston in the mid 1800's. The Port of Boston flourished as a trade and shipbuilding center through World War II, but then went into a severe decline. In the late 1950's this neglect was reversed with the creation of an independent public authority called Massport. In 17 years of operation, Massport has invested almost half a billion dollars in major capital improvements at Logan Airport and the Port of Boston. Some of the more significant new facilities that have been financed through Massport's bonding authority are:

—*Deepwater unloading facilities.* Boston is the only East Coast port north of Florida that can accommodate 40-foot draft vessels. Shown here is the U.S.S. Ponderosa with 30,000,000 board feet of lumber.

—*Container facility.* These modern, high speed cranes and computerized inventory control systems are part of a highly flexible, fast, and efficient container cargo handling operation. With berthing space for the largest container ships afloat, the terminal can load and unload a minimum of 60 containers per hour and store up to 4,000 containers at any one time.

—*Pier facilities.* Among the six major installations are a commercial fish pier, lumber handling and storage facilities, a million cubic foot dockside freezer, and a U.S. Department of Agriculture meat inspection facility.

—*Passenger facility.* A renovated passenger facility has increased the convenience and personal comfort of travelers and has made Boston the fifth largest passenger ship port in the United States.

Logan Airport has also undergone extensive modernization to increase the security and speed of both freight and passenger service. Major runway extensions provide greater safety and less noise. A new International Terminal serves 10 foreign airlines, with gate space for up to 13 aircraft at the same time. Among the several new domestic terminals is the \$50 million South Terminal, with space for 29 planes. The terminal also includes a modern traffic circulation system and 2,700 parking places.





Although we have often been called the "end of the line" for some domestic shipments, we are the "beginning of the line" for foreign shipments. Logan is one hour closer to Europe, and airfreight charges average 5 percent cheaper, than any other major airport in the United States. The Port of Boston is one day closer to Europe than any other port on the Eastern Seaboard. Over 30 steamship lines regularly visit the Port of Boston and make direct deliveries to more than 150 foreign ports of call in 50 countries. Since 1969, containerized freight through Boston has increased about thirtyfold. Partly as a result of this, the Port of Boston is now the fastest growing port on the East Coast.

Massport is a major asset for business and, because of certain special things that the port does, there are opportunities here that never existed before. For example, special chartering arrangement to land 7 to 8 million board feet of West Coast lumber in Boston at significant savings is possible only because of the harbor's 40-foot draft capability. In another example, the Fruehauf Corporation recently invested \$2 million in making available cargo container chassis designated exclusively for Massport service. This has increased the frequency of service for containerized freight.

Foreign Trade Zones

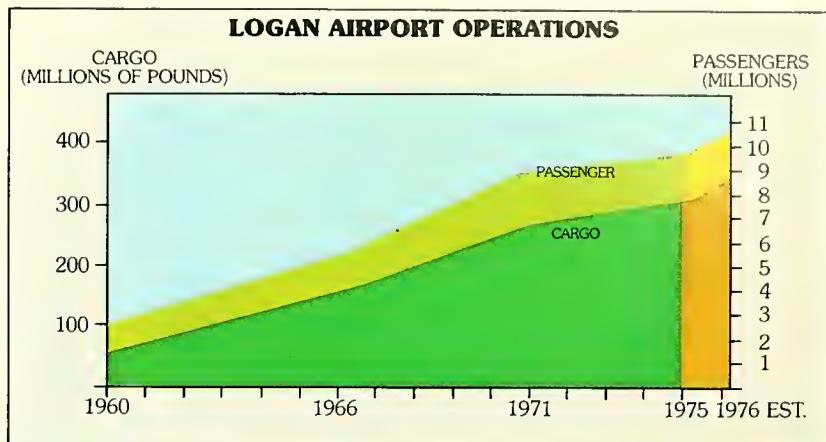
Early in 1977 the United States Foreign Trade Zone Board gave final approval to the creation of two new Foreign Trade Zones in Boston and New Bedford — the first such zones in New England.

Massport's Foreign Trade Zone will be at the former South Boston Naval annex. New Bedford has set aside more than 22 acres at the airport only a short distance from their seaport. Both sites have ample room for expansion. But the physical differences of the two sites suggest the different nature of each operation. Massport's will make the facilities of the Port of Boston more attractive for domestic and international investment. New Bedford's will attract new industry to an industrial park.

Foreign trade zones offer a number of advantages to importers and exporters:

- Imports may be landed and stored quickly without full custom formalities.
- Goods may be processed, assembled or packaged within the zone in order to qualify for the lowest duties and freight charges.
- Duties can be avoided on damaged or substandard items.

- Buyers can inspect and sample goods displayed at a zone showroom before purchase and payment of duty.
- Cash flow is improved since duty is not paid until goods leave the zone.
- Goods in excess of U.S. import quotas can be imported and held in the zone until the next quota period.
- Goods subject to a U.S. quota can be imported into a zone and fabricated into a product not subject to quota limitations.



Intercontinental Air Freight Corporation

Intercontinental Air Freight Corporation was established at Boston's Logan Airport 15 years ago, and has since grown to be one of the ten largest international airfreight forwarders in the United States. By taking advantage of the accessibility and quality of facilities at Logan, and by using the latest computerized equipment developed by Massachusetts companies, Intercontinental Air Freight has doubled in size in the last four years. It has contributed greatly to the growth in airfreight business at Logan and has helped bring overseas markets closer to many companies. John Ford, Executive Vice President of Intercontinental, explains that trend this way, "Up until about five years ago foreign traders thought that New York was the capital of the United States and the rest of the country was just a suburb of New York, but there has been a definite trend away from that. The high technology industries we have here lend themselves to international trade, so there has been a growing recognition in Massachusetts that is related to the efforts of these companies. Intercontinental has been a catalyst in this process. — Our strategic location makes it possible to guarantee overnight shipment to European ports to any shipper within four hours trucking distance of Boston." The speed and accessibility available at Logan for airfreight is shown in these time lapse photos of unloading and reloading all of the cargo in a 747 airplane.



Taxes

Massachusetts has taxes, and, as in any state, they are an important cost of living and doing business. Comparison of tax rates among states is very difficult because of widely differing tax structures and various credit, incentive, and abatement plans. Likewise, it is very difficult to compare the quality of public services rendered by states for those taxes. However, there is one relationship that is clear, and one that we have shown in the accompanying charts. States that tend to collect more taxes also tend to provide their residents with more services.

The comparison of the total tax revenues from all sources per person, per year, changes from year to year and, while it is

generally among the top five, Massachusetts is also always near the top in per capita expenditures. Government services and social programs cost money, and in states which collect more taxes you can expect more services. Massachusetts has a long-standing reputation as a leader in social legislation and a great many "firsts" in Massachusetts have served as models for other state and Federal laws.

But, along with responsible social legislation, a state must be responsive to the needs of the taxpayer. The Massachusetts legislature is aware of this and in recent years has passed a series of tax changes to provide incentives for business growth.

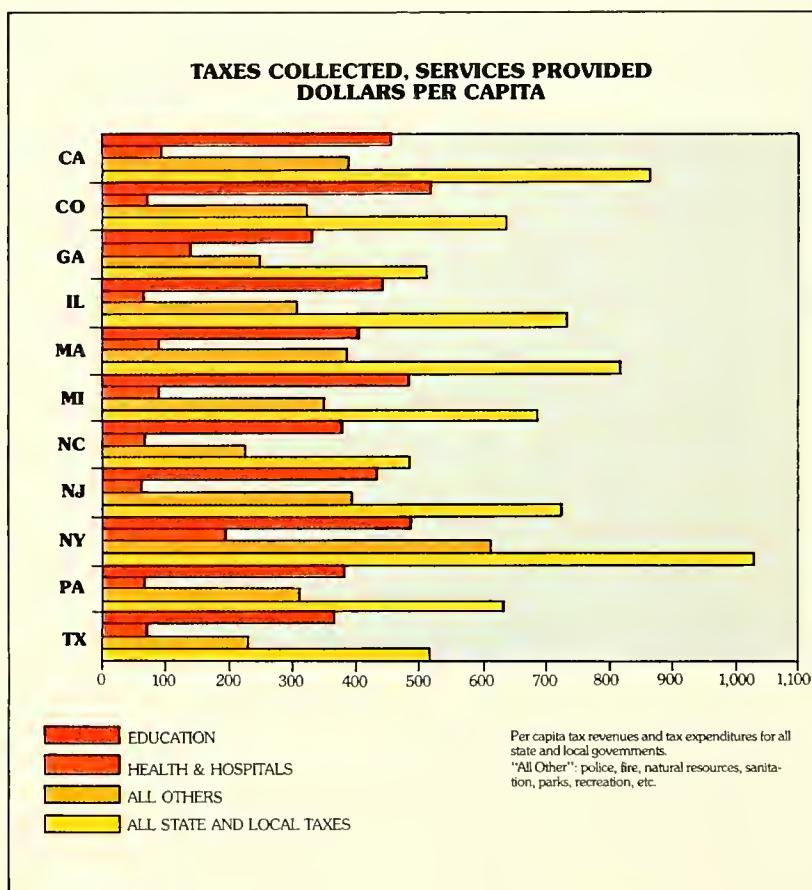
Development Tax Incentives

With our large cities generally having financial problems, and the present lack of Federal funds for urban renewal, one would think that this is hardly the time for a large scale, publicly sponsored project combining historical preservation, neighborhood revitalization, and major new retail and commercial space. But Faneuil Hall Marketplace is just that. Built originally by Peter Faneuil in 1740 as a public market and meeting hall, it was the scene of many pre-Revolutionary War rallies. In 1826 three new buildings were added to form the Quincy Market. Acquired by the city a number of years ago, it was restored to basic structural soundness, provided with new utilities, and leased to a major commercial developer. The Rouse Company, following the concept of Massachusetts architect Benjamin Thompson, has turned the site into an overnight commercial and artistic success. But, as Development Director Roy E. Williams puts it, "Faneuil Hall Marketplace is a regional development. It's not just for downtown Boston, or even the three million people in the Metropolitan area, but for all of New England." A cluster of independent, specialized, retailers provides both a convenience for neighborhood residents and a tourist attraction. The City of Boston has made this possible without an added tax burden on the local tax rate. The Rouse Company pays taxes in proportion to the level of rents and sales by the occupants. This provides Rouse with a sure way to calculate payments to the city, and as Mr. Williams said:



"You are not continually working in the unknown and being unpleasantly surprised and possibly victimized by capricious assessments."

What the success of the Faneuil Hall Marketplace suggests is that, high local property taxes notwithstanding, Boston is commercially alive and doing business.



Chapter 827 of the Acts of 1975, signed into law by Governor Dukakis in December of last year, made sweeping changes in Chapter 121A which is the statute governing the formation and activity of urban development corporations. The intent of the amending legislation was to provide a more viable mechanism for development purposes and to update the enabling act which had remained virtually unchanged for a decade.

An urban development corporation established under the provisions of this Chapter may undertake the construction and management of a residential, commercial, industrial, institutional, recreational or governmental project. This includes a new construction or a rehabilitation or conversion project. Developers are offered a tax agreement incentive

in order to encourage the investment of private money in blighted, substandard or decadent areas. Eligible sponsors include charitable non-profit corporations organized under Chapter 180, individuals or associations of individuals, insurance companies, trusts, savings and cooperative banks.

Chapter 121A has been used successfully as a means of providing low and moderate income housing, historic rehabilitation and some limited commercial development on sites that would otherwise require the expenditure of public funds.



—Prudential Center Office Building/shopping complex, hotel and mall, which transformed an old railroad yard into the center of a vital new commercial and office center.
\$190,000,000

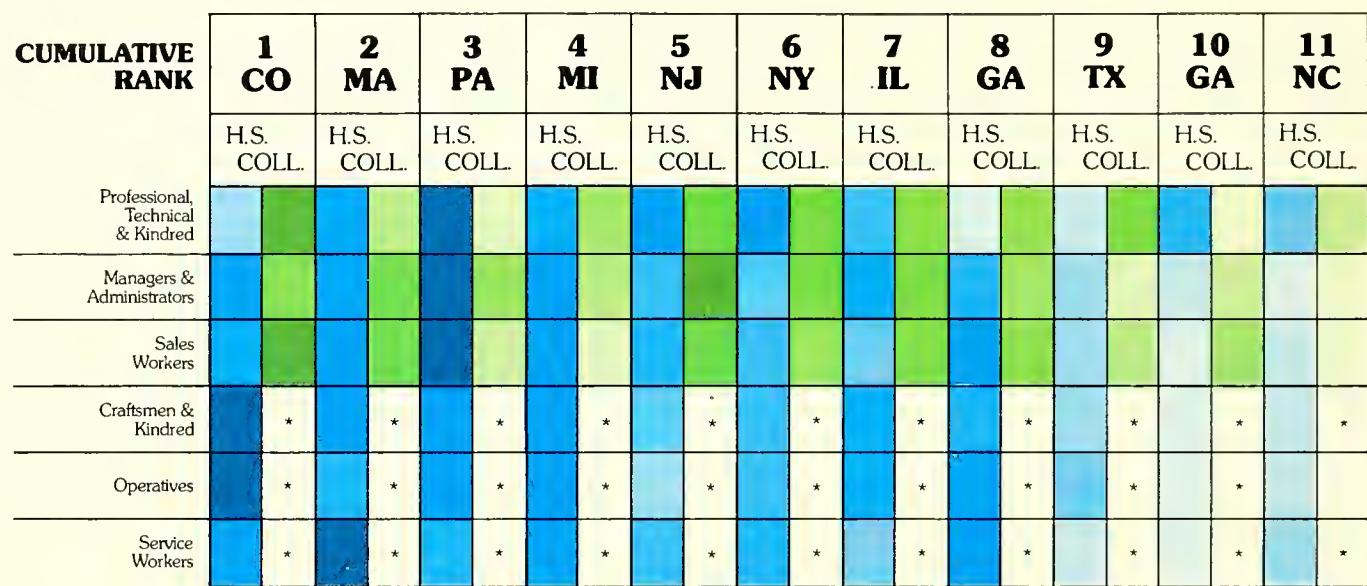
—One Beacon Street. A major office building located adjacent to historic sites and the Government Center complex, which called for sensitive design and siting.
\$55,000,000

—Stone and Webster Engineering Company building. The tax abatement which led to the construction of this facility, in an area undergoing total revitalization as an extension of the office/financial district and as a new transportation center, was a key inducement in keeping this major employer in Boston.
\$35,000,000

—Jordan Marsh—demolition and reconstruction of a large portion of Boston's biggest department store, also part of a major, internationally financed hotel/office/commercial redevelopment in the heart of the shopping district.
\$30,000,000



EDUCATION COMPLETED IN SELECTED OCCUPATIONS



Cumulative rank order is determined by ranking each state in each category (for example, Managers & Administrators completing high school) and then summing the ranks of all categories.

*too low to rank (less than 3 percent)

1 2 3 4 5 6 7 8 9 10 11 HIGH SCHOOL

1 2 3 4 5 6 7 8 9 10 11 COLLEGE

AVERAGE WAGES—SELECTED OCCUPATIONS

	DETROIT MI	NEW YORK NY	LOS ANGELES CA	CHICAGO IL	DENVER CO	PHILADELPHIA PA	ATLANTA GA	BOSTON MA	DALLAS TX
SECRETARIES (WEEKLY)	220.00	240.50	195.50	182.00	189.00	179.00	177.00	177.00	173.50
COMPUTER SYSTEMS ANALYSTS (WEEKLY)	383.50	385.50	359.50	351.00	381.00	365.00	349.50	351.50	341.00
MACHINISTS (HOURLY)	7.14	6.73	6.63	6.63	6.10	6.47	6.07	5.81	5.95
SHIPPING & RECEIVING CLERKS (HOURLY)	5.60	4.98	4.63	4.50	4.80	4.83	4.54	4.82	4.14

Another important factor in doing business is the quality and availability of a labor force. The charts in this section relate to that labor force in Massachusetts, and while the comparisons shown are only a few of the great many that can be made, they give a good overall picture of a mature and stable work force. In general, Massachusetts workers are well educated. In the first chart we compared the educational levels of different occupations across the eleven states, and then combined the rankings to give an overall weighted score. Massachusetts was second.

Work stoppages because of strikes and union problems are relatively low in Massachusetts, especially when compared with other industrial areas. The reason seems to be, in great part, because of the good labor-management relations that are found here. The Bureau of Labor Statistics' figures show Massachusetts to have the lowest figures of any of the older industrial states except New York.

Wages and salaries in the Boston area are lower than in many comparable urban areas. The table shows the average earnings and relative wages for eight diverse occupations in nine metropolitan areas. Boston is the next lowest, overall, and considerably lower than the highest. For example, machinists that average \$7.14 per hour in Detroit average \$5.81 per hour in Boston.



Greater Boston Labor Council, AFL-CIO
Mr. Lawrence Sullivan, Executive Secretary

Labor-management relations are pretty good in Massachusetts. The reason for that is that the relationship between labor and management is more intimate – a little more empathy. One of the things that we don't have is outside absentee management, with a decision-making apparatus far removed from where the effect of those decisions occur. In Massachusetts we have a lot of companies where the management lives here and they are concerned with the state and all the people. They have a closer relationship with the state rather than reacting to missives from some far away board room. I think that Massachusetts may be unique here, and has a certain strength in its small businesses. It produces a certain stability.

It is a frustrating thing for me, for any human being, to be subjected to capricious decisions on which we have no effect but which affect our well-being and our families. So the situation in Massachusetts labor/management relations the last 20-35 years has been fairly decent.

Input Output Computer Services, Inc.
Cambridge, Massachusetts
Mr. Thomas A. Farrington, President



We have found Massachusetts to be a good place to start and develop a business engaged in high technology areas. This is primarily due to the quality of computer and engineering professionals within the State. Their education and experience is well suited for our type of company. Also, we find the labor force to have a kind of unique attitude necessary to transform a small and pioneering company into a position of leadership within its industry. IOCS plans to continue on its growth within Massachusetts.



Western Electric, Merrimac Division
No. Andover, Massachusetts
Mr. David Hilder, General Manager

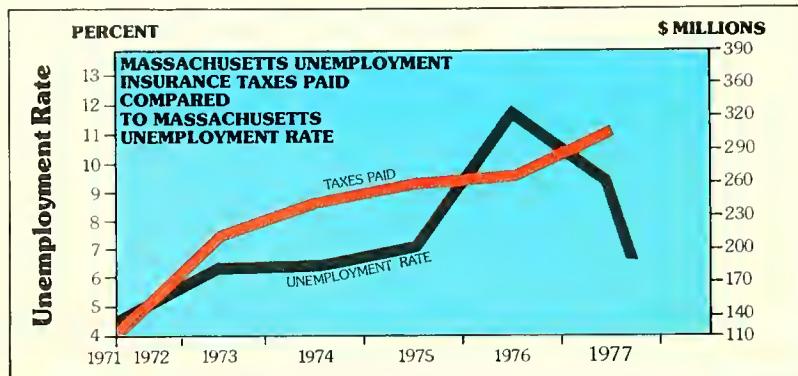
There is a difference in factory workers in this area just because for generations they have been working in factories. It's a life style you might say. I think that is one reason why our turnover rate here is not as high as in some of our other locations. The people seem to be more congenial and enjoy the work in an industrial plant. We have noticed a lot of people who have grown up in New England and have a good education, particularly in engineering, are more inclined to stay in New England. When we have requirements for particularly highly-trained people, we recruit heavily in this area. Around Boston there is an attraction for better-educated, professional people. There is the opportunity for professional people to improve themselves with advanced degrees. The schools make it easier with evening classes and summer sessions, better than in many areas of the country. Eighty-seven percent of our technical professional group have degrees, and I'm surprised at the number of Master's degrees we have on the technical staff – more than 30 percent.

Foxboro Company
Foxboro, Massachusetts
Mr. Earle Pitt, President



"We have been pleased with the people we've been able to hire in Massachusetts. In fact, I don't think you could find a richer concentration of skilled people. We have some unskilled jobs at Foxboro, of course, but mostly we look for people to run machinery; people who can lead a second or third shift assembly team; people who can calibrate precision instruments or build complex systems. The availability of this level of skilled people has certainly been a plus for Foxboro. And there are reasons for this. You know, the industrial revolution began in the northeastern part of the United States, while most of the rest of the country was still essentially rural. So you have a long background of craftsmanship in people – their fathers and grandfathers were skilled before them. Yes, I would say that people are the Bay State's single greatest industrial strength."

Workman's Compensation and Unemployment Insurance



WORKMEN'S COMPENSATION PREMIUM RATES (SELECTED OCCUPATIONS)

OCCUPATION	CA	CO	GA	IL	MA	MI	NJ	NY	NC	PA	TX
BOOT OR SHOE MANUFACTURERS	2.45	.62	1.49	1.15	2.26	1.84	1.72	1.80	.59	1.15	2.14
BOTTLING	N.A.	1.94	2.48	4.09	7.06	3.84	6.21	6.10	1.00	3.65	5.10
CAN MANUFACTURING	4.34	1.72	3.05	3.49	6.30	3.10	5.68	3.50	.89	3.60	2.96
CANVAS GOODS MANUFACTURING	4.79	1.23	1.75	3.86	3.55	4.89	2.20	2.90	.91	2.25	5.10
CLAY OR BRICK MANUFACTURING	N.A.	3.55	3.92	9.36	8.40	14.07	N.A.	6.30	1.23	N.A.	6.28
CLERICAL OFFICE EMPLOYEES	.26	.12	.13	.16	.15	.24	.24	.22	.06	.15	.21
CONCRETE CONSTRUCTION	9.47	3.50	3.93	10.58	6.85	7.96	5.86	5.40	2.63	3.60	8.91
COPPER GOODS MANUFACTURING	N.A.	1.16	2.69	3.99	3.45	1.50	3.01	4.30	1.23	2.30	3.07
DENTAL LABORATORIES	.99	.49	.68	.73	1.21	.96	.59	.53	.33	.62	.92
ELECTRICAL WIRING	3.23	1.69	2.12	3.63	2.18	2.61	2.57	2.70	1.40	1.45	3.83
JEWELRY MANUFACTURING	1.43	.50	.70	1.40	1.14	1.34	.97	.87	.40	.71	.95
MASONRY	6.33	3.24	2.87	6.83	5.29	5.44	5.54	5.20	1.60	2.75	5.47
OPTICAL GOODS MANUFACTURING	1.02	.32	.55	.95	1.16	.92	1.01	.94	.27	.62	1.15
PAPER MANUFACTURING	5.63	2.48	2.58	6.37	4.36	4.39	5.40	5.90	.89	2.80	1.66
PLASTICS	N.A.	2.56	2.69	4.78	4.48	6.29	4.53	3.40	1.08	2.30	6.80
TRUCK DRIVERS	7.49	3.59	3.29	6.56	5.33	6.69	6.67	5.10	1.90	4.15	6.61

Additional fees in all states except Illinois, Massachusetts and Michigan are assessed for administering state workmen's compensation departments.

Nationwide, unemployment insurance taxes have become a major cost of doing business, and Massachusetts is above the average of many states. The total unemployment taxes paid by businesses in Massachusetts in 1975 amounted to \$270 million. By way of comparison, the state's total corporate income taxes collected for the same period was \$229.9 million. Thus, the cost of maintaining the unemployment insurance system has become a large expense item for industry. The amount of unemployment insurance taxes which businesses pay is basically the result of both the number of people out of work and the level of benefits paid to the jobless worker. Higher benefits require high contribution to support those payments. Because the benefit costs have been so great, Massachusetts during the past two years became one of 21 states which had to borrow from the Federal government in order to meet their obligation to the jobless.

These are the facts and, while we are not trying to make them look better than they are, we would like to tell you what we are doing about them. The first effort is the creation of more jobs by encouraging industrial development and improving the business climate. The second effort is in reforming the state's employment security system to give a better balance between the needs of the workers and the cost to employers. The 1976 Massachusetts Legislature passed a bill that improves administrative procedures and sets more stringent standards for eligibility to receive unemployment insurance benefits. Included in the bill were requirements for more active efforts on the part of the unemployed to find work. Provisions have also been made to provide greater rewards to companies with good employment records. Additional changes are now being considered by the Legislature.

Workman's compensation insurance is a smaller but often irritating payroll cost for the nation's employers, and Massachusetts has often been reproved for having high premiums. In the table comparing premium rates for a representative sample of various trades across eleven states, one can quickly see that, while Massachusetts' rates are not the lowest, neither are they the highest.

Massachusetts has always been known as a financial center and, as with so many other pursuits, this reputation comes not from sheer size, but rather from the quality of financial management and knowledge in several key areas. The mutual fund, for example, began in Boston over 50 years ago and, as can be seen from the chart, more mutual fund assets are managed here than anywhere else in the United States.

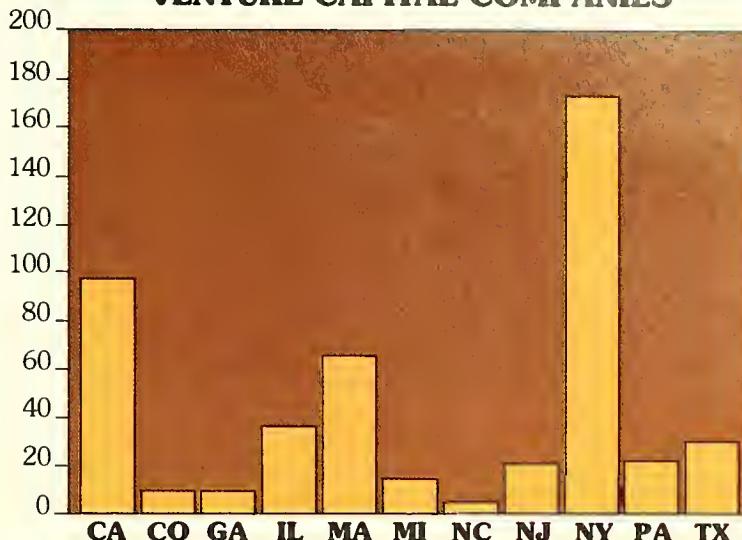
Mutual funds are usually thought of as a fairly safe kind of investment, so it may be surprising that Massachusetts also is one of the three principal centers for venture capital financing in the country. Although New York and California lead in the actual number of venture capital companies as listed in the chart, both states are several times the size of Massachusetts. Among venture capitalists, the financing of new high technology enterprises is a very special skill, and this too was pioneered in Massachusetts.

American Research and Development Corporation was founded in 1946 as one of the first, and ultimately the largest, venture capital firm in the high technology area. Until the passage of the Small Business Investment Corporation Act of 1958 banks were prohibited from investing their own funds in these enterprises. Nevertheless, prior to 1958 the First National Bank of Boston was a prime mover in bringing together money and new technological ideas. William Raye, former Senior Vice President at the FNB, became the one to see if you needed money to finance a new high technology venture. As Raye puts it:

"It seemed a natural thing for the bank to do at the time. We were the largest bank in Boston by far, and so we inevitably played a leading role in the community. We knew the people at Lincoln Lab and at MIT, and we seemed to be able to understand them and speak their language."

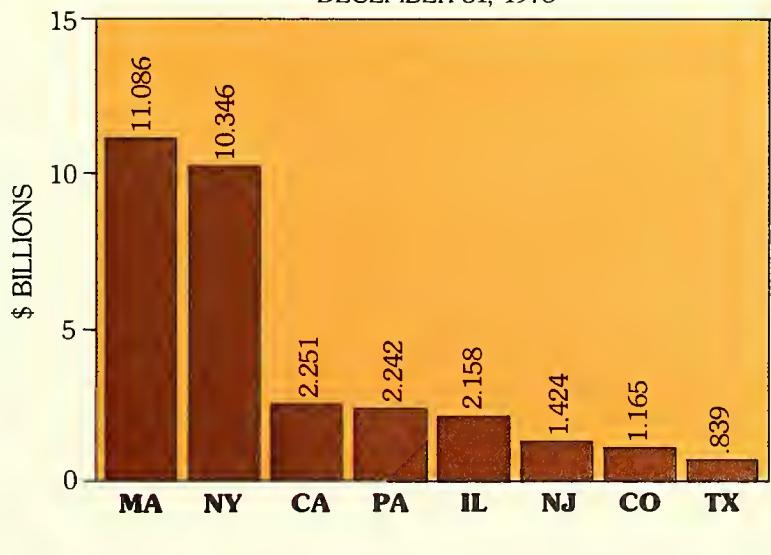
After passage of the SBIC Act, the First immediately applied for a charter to form First Capital Corporation of Boston, a wholly owned subsidiary, which was the first of its kind in New England, and only the fourth in the United States. The portfolio now includes over 70 companies and investments of over \$10 million book value, mostly in New England. Thus, the First continues to be one of the "premier venture capital groups" in the country, and the knowledge and skill in how to invest capital still remain a Massachusetts commodity.

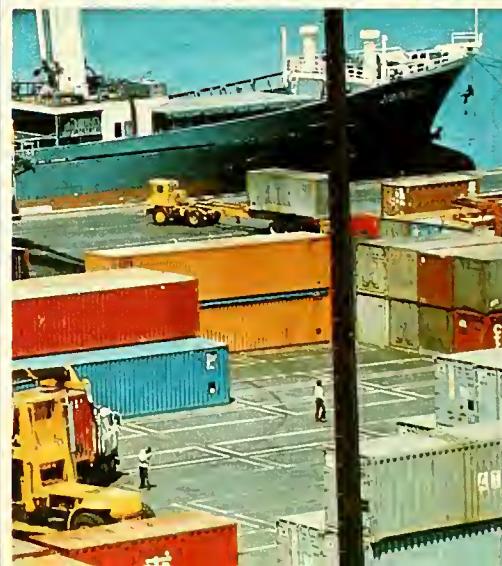
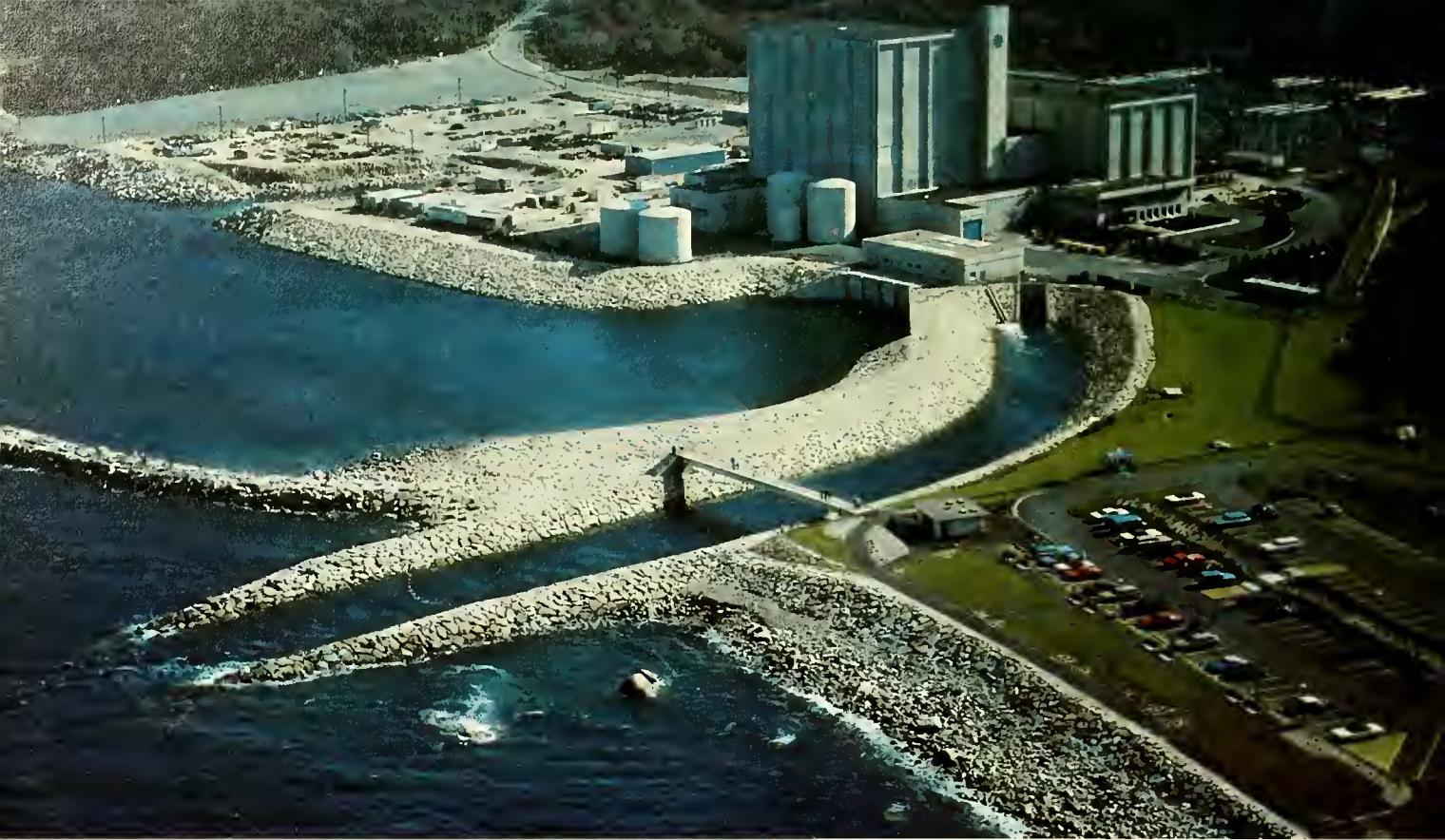
VENTURE CAPITAL COMPANIES

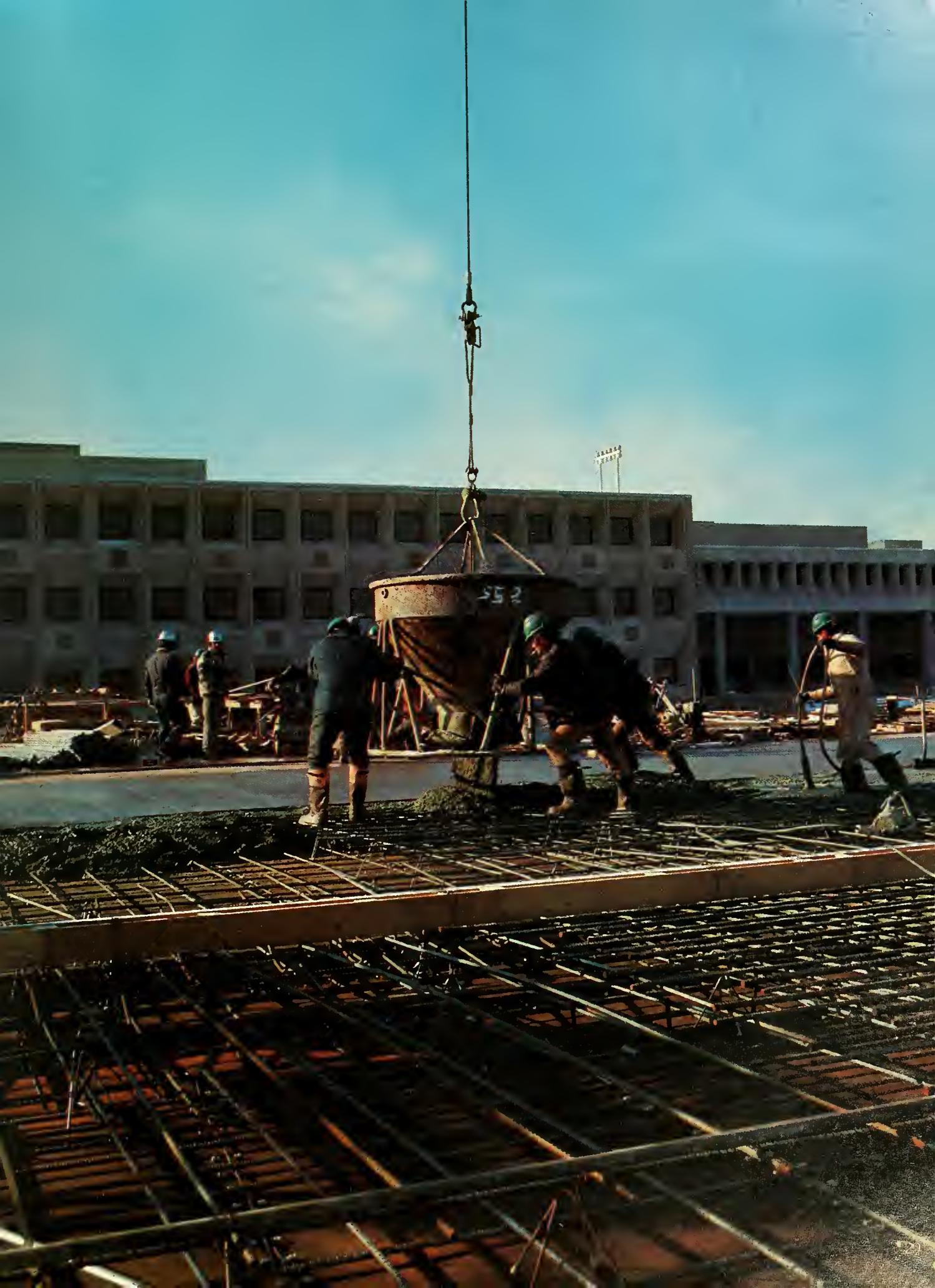


TOTAL MUTUAL FUND ASSETS

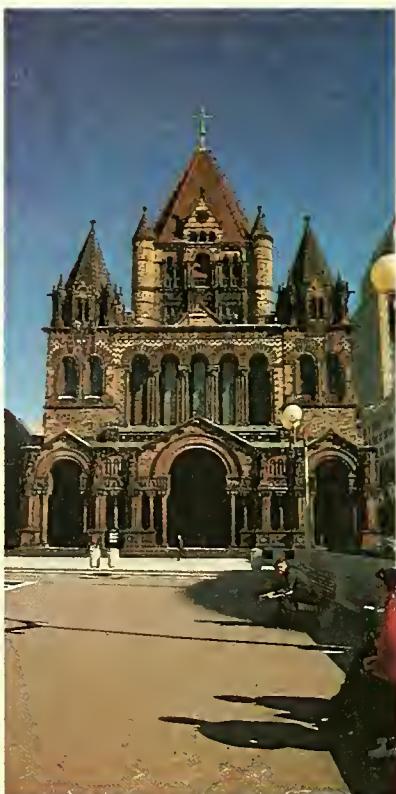
DECEMBER 31, 1975







The Professional Environment

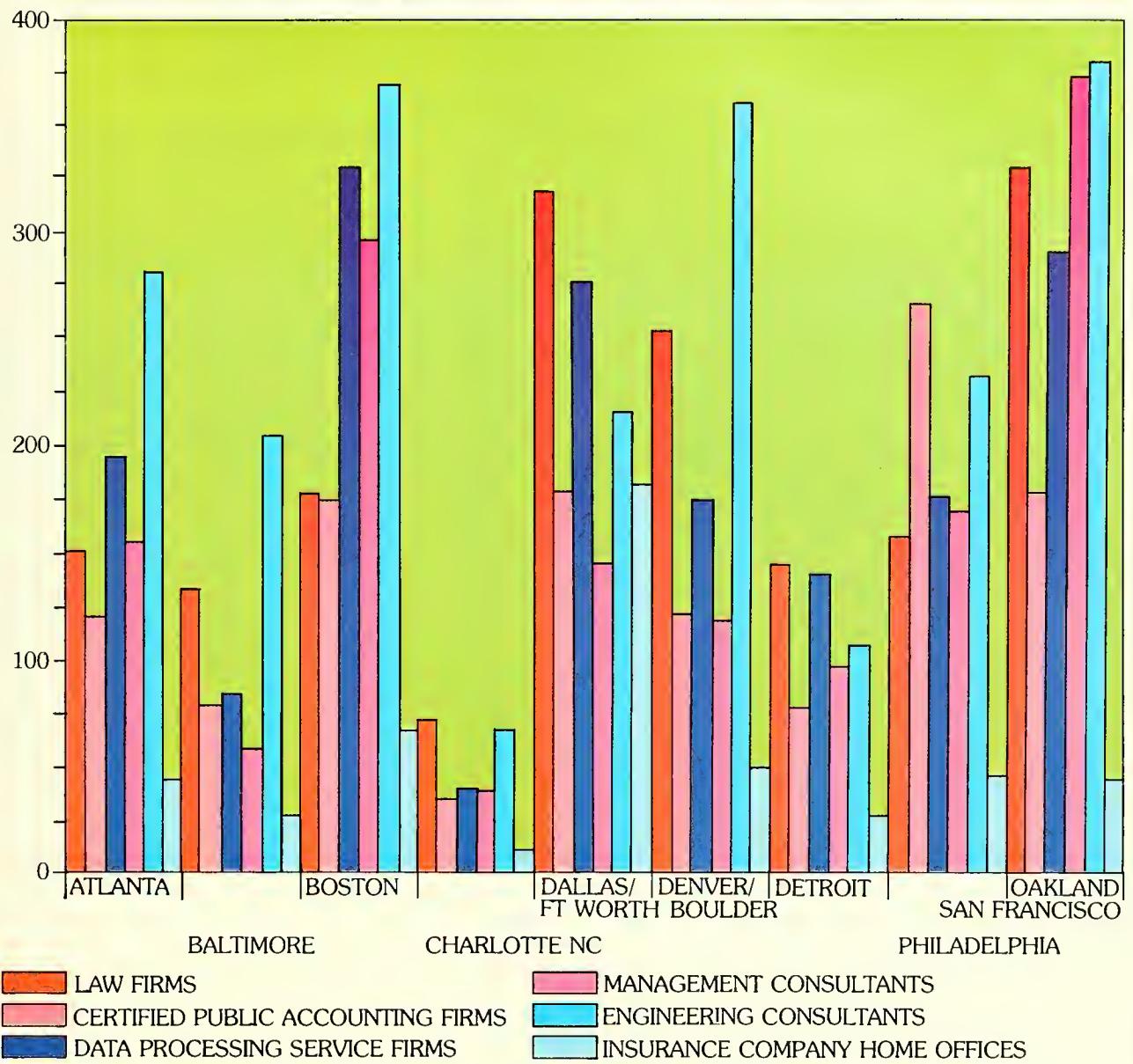


Boston is a city of professionals. It has one of the world's greatest concentrations of outstanding minds and talented people. In fields ranging from accounting to zoology, Boston affords more opportunities than other cities of comparable size for that exciting interaction among peers, that exchange of ideas, and that mutual influence that is so critical to professional growth. The immediate availability of large numbers of a wide range of professional talent provides benefits to the individual that are only outweighed by the benefits to the community as a whole.

There is no way we could count all of the professionals in Boston, or even list their fields, but we have taken a cross-section and made comparisons with eleven cities. In the table shown here, we are comparing actual numbers, so have not included Los Angeles, Chicago, or New York, but rather selected cities of relatively the same size. In data processing service firms, Boston is ahead of everyone with 330. Only Philadelphia has significantly more certified public accountant firms than Boston. There are more consultant engineers and management consultants than in any city except San Francisco-Oakland. Only Dallas-Fort Worth has more insurance company home offices. These numbers may help indicate the size and variety of our professional pool, but the effect of this pool on the psychological environment cannot be measured; it can only be felt.

In July 1976, The Journal of the American Institute of Architects published the results of a survey they had taken on the "proudest achievements of American architecture over the past 200 years." Although Thomas Jefferson's University of Virginia campus won first place handily, Boston received 69 votes for 28 buildings. Shown here are some of those buildings. We are proud of them too.

CONCENTRATION OF PROFESSIONAL SERVICES





But Boston is not the only place in Massachusetts with an active and stimulating professional climate. Throughout the Commonwealth are examples of professional activity and opportunities to be found nowhere else in the nation. Massachusetts' institutions, laboratories, and research foundations have a worldwide reputation not only for the quality and creativity of their work, but also for the impact they have had on the thoughts and ideas of intellectuals everywhere. Here are a few examples.

Oceanography at Woods Hole

Located in one of the most picturesque parts of the state, near Falmouth on Cape Cod, the research facilities of Woods Hole comprise three principal organizations.

—*The Oceanographic Institute* uses five major research ships, including one capable of descending more than two miles beneath the surface, to explore the physical, chemical, and biological properties of the oceans. Supported in large part by the Office of Naval Research and the National Science Foundation, the Institute has cooperative degree programs with MIT, Yale, Brown, and Harvard Universities.

—*The Marine Biological Laboratory*, which dates from 1888, provides resident research and active teaching programs in various fields of biology, ecology, chemistry, and related disciplines. Laboratory facilities and living accommodations are available to qualified individuals who come here to work with an international group of students and scholars.

—*The Northeast Fisheries Center*, under the direction of the National Marine Fisheries Service, carries out research in resource assessment, marine ecosystems, and environmental assessment. In addition to continuing studies of the distribution and abundance of most commercially fished species, this facility does comprehensive analyses of the physical, chemical and biological character of the offshore area, including the long term effects of toxic wastes and oil exploration.

Biology at Worcester

The Worcester Foundation for Experimental Biology, founded in 1944, is perhaps best known as the place where the oral contraceptive pill was successfully developed. The Foundation is now the third largest independent research institution of its kind in the United States and, in addition to its continuing work in human reproduction, has major programs in cancer research, neurobiology and related fields.



Engineering at Amherst

Another major educational and research center is located in the beautiful Connecticut River Valley where the University of Massachusetts and four prestigious private colleges are all within a twenty mile radius. The University, like any major university, carries on a wide range of activities that have had a direct impact on the state's economy. The Agricultural School, for instance, helped put the cranberry industry on a sound basis, making Massachusetts the largest cranberry producing state in the nation. The highly regarded School of Engineering has in recent years been directly involved with the problems and challenges of a changing society and economy in Massachusetts. Literally dozens of projects, many with direct funding and support by Massachusetts companies, are addressing industrial and community problems. A sample of these includes:

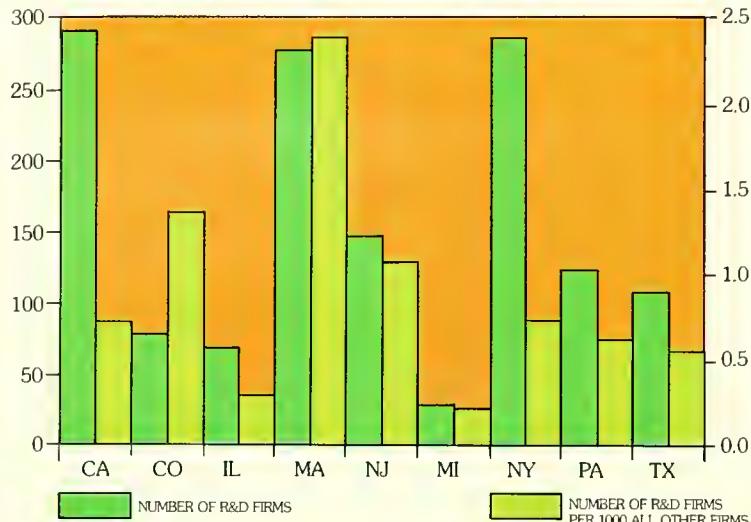
- Fundamental semiconductor design.
- A standardization program for grinding wheels.
- An aquaculture laboratory in southeastern Massachusetts.
- A system for planning investments in new power generation facilities.
- A patient flow system for hospitals and health centers.



Wherever you go in Massachusetts you will find professional people doing professional things and, in the bargain, influencing not only their fellow professionals but everyone around them. Whether they are attracted here by the great universities, the quality of life, or the magnet of distinguished competition, the professionals are definitely here and likely to stay.

Where High Technology Grows

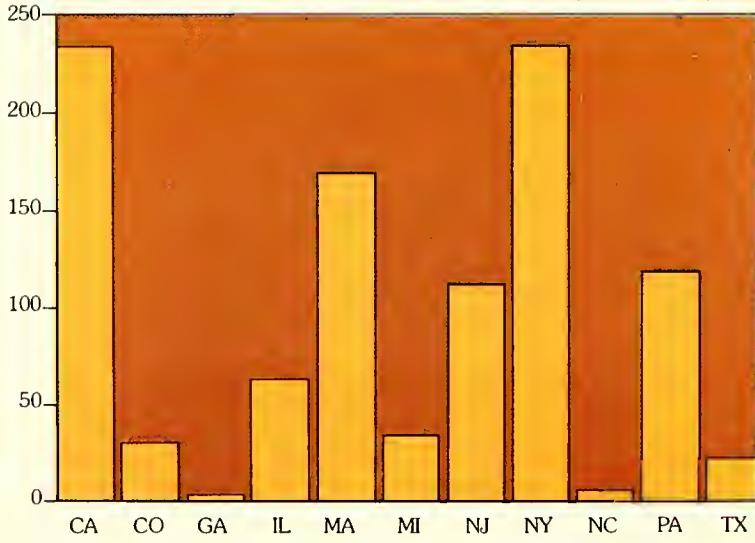
CONCENTRATION OF SMALL RESEARCH AND DEVELOPMENT FIRMS



The generation of new, high technology companies requires a special environment that only occurs in a few regions in the world, and the Greater Boston area is perhaps the best example of where it happens. Exactly what the essential elements are that form this environment has been a major object of study by Richard S. Morse, President, MIT Development Foundation. Mr. Morse is a pioneer in the new enterprise process, both as a scholar and as a participant. In 1946 he founded National Research Corporation, one of the first successful efforts to apply military technology to civilian commercial uses. More recently, he was the chief force in establishing the MIT Development Foundation. He has himself been a successful entrepreneur in numerous new companies and has analyzed and written about hundreds more. He explains his view of the process by saying:



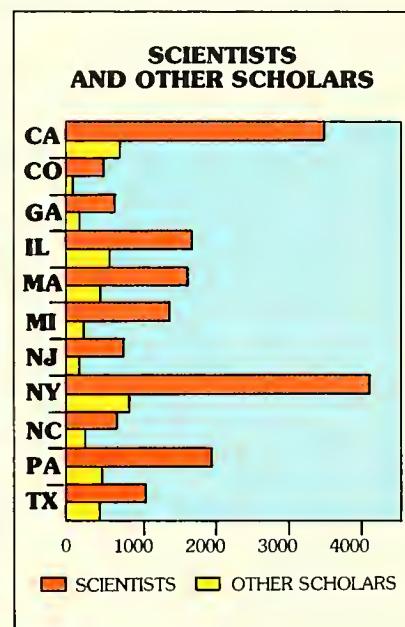
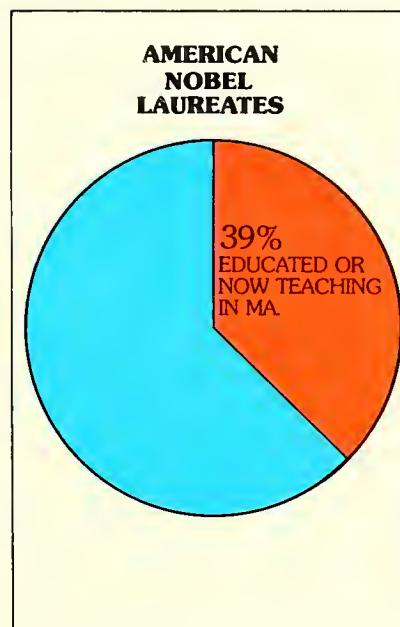
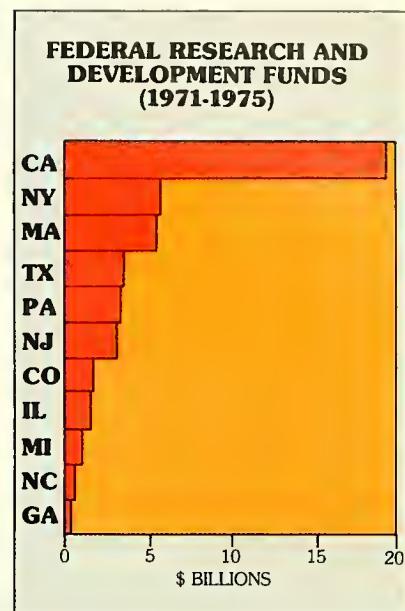
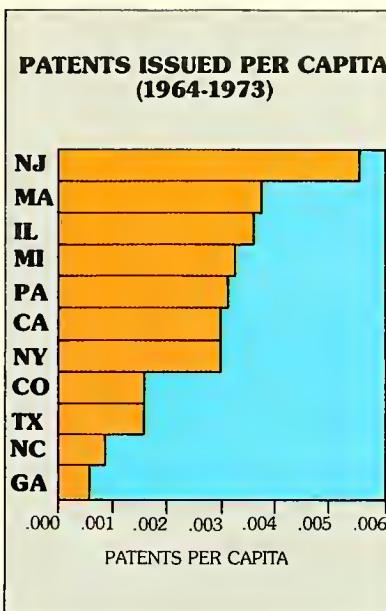
INDUSTRIAL RESEARCH MAGAZINE ANNUAL AWARDS FOR TECHNOLOGICAL INNOVATIONS (1963-1973)



“Within the United States we have areas of highly innovative activity and corresponding regions where it is essentially non-existent. Greater Boston and Palo Alto can be cited as regions of high ‘new enterprise’ generation. (Other) areas have fine graduate schools, venture capital sources, and a high concentration of industry, . . . (but) . . . are essentially devoid of this type of operation. A number of essential ingredients are necessary for the generation of new technical enterprises, including venture capital sources, entrepreneurial skills, advanced technology and markets for unique products. More important than anything else is perhaps the concept, ‘entrepreneurship breeds entrepreneurship.’ People are stimulated by the success of others, and once the idea of forming a new company has been demonstrated, other potential entrepreneurs try it in the same region.”

Massachusetts has the "essential ingredients" spoken of by Mr. Morse and, as can be seen in the tables, they are here in abundance. The absolute number of small research and development companies in Massachusetts is almost as high as in the large states of California and New York, but, when the figures are adjusted for population, one sees that the concentration is over three times as great. The same thing holds true for the number of *Industrial Research* annual awards for best technological innovation. Massachusetts is a very close second to California, but obviously way ahead on a proportionate size basis. The trend continues in the table showing the amount of Federal R&D expenditures, where Massachusetts is third to New York and California. In patents issued per capita, Massachusetts is third to New Jersey and Connecticut.

These charts deal with the companies, but it is also true that the people who make these things happen are here too, as the next three charts show. One shows the number of scientists as listed in *Men and Women of Science*; another the number of scholars as listed in *American Scholars*. The table on Nobel Laureates is one of our proudest, for it shows that 39 percent of all American Nobel Prize winners were educated in Massachusetts or are presently teaching here.



New Enterprise and Academia

When Massachusetts companies, particularly the high technology ones, talk about their partiality to this area, they very often mention the advantage of being close to Harvard and MIT. This is usually a shorthand reference to the tremendous vitality that higher education provides to high technology industries in Massachusetts. While the activities of venture capitalists, the number of patents issued, and the number of industrial research awards to Massachusetts companies provide some indication of the relationship, perhaps the best way to see it is to scan some of the many Massachusetts companies that arose directly from the academic world. The process of one company originating from a larger related company—commonly called a “spin-off”—is not an unusual happening in our economy. But what takes place in Massachusetts, the academic spin-off, is a unique form of this process. It is as common here as it is rare elsewhere. The firms featured here are typical of the hundreds that were conceived in the higher education community here and are now prospering in Massachusetts.

Energy Research and Technology, Inc.

This company was started in 1968 by two Ph.D. meteorological graduates from MIT and an experienced business manager as a consulting service in the area of air pollution. Because Massachusetts' air pollution regulations were well ahead of the Federal ones at that time, ERT got a big initial boost by doing a significant amount of business with Massachusetts utility companies. In addition, according to Elliot Newman, Marketing Vice President, “the availability of trained personnel directly from Harvard and MIT was a major factor in supplying the needed talent.”



ERT soon discovered the need for highly accurate, continuous 24-hour data on the distribution and quantity of air pollutants, and developed a unique, self contained instrument module to take these measurements. The modules, located in about 250 sites around the Northeast, feed over 1,000 measurements hourly into two major computer centers, and form by far the largest single air pollution measurement system in the world. This system and the hard data it

provides, has allowed ERT to develop highly accurate air pollution diffusion models. Some of the main components of the system were developed in cooperation with other Massachusetts companies, particularly Data General Corporation.

The company presently has 600 people on its staff, including probably the largest number of meteorologists and biologists of any private organization in the country, and in the last five years sales have grown from about \$2 million to about \$16 million annually. This growth comes from the company's technical knowledge and leadership in an emerging field; however, Vice President Newman also feels, “If we hadn't been in the Boston area, we couldn't have pulled it off.”

Eco Control Systems

ECO-CONTROL, INC. was incorporated in 1971 by a group of Harvard graduate students as an interdisciplinary research company. Their first work in environmental monitoring and consulting was largely an extension of their graduate studies.



Company operations soon entered the energy field with the discovery of a chemical system for storing halogens and its application in metal-halogen secondary batteries suitable both for traction vehicles and for electric utility load leveling. One phase of this patented battery technology is being licensed by Exxon and another phase is being developed jointly by ECO-CONTROL and Gould, Inc. under contract to the Electric Power Research Institute.

In addition to energy related work, which is expected to yield a product by the mid 1980's, ECO-CONTROL manufactures specialty chemicals labeled with stable isotopes, such as deuterium, carbon-13, and nitrogen-15. These labeled chemicals, unlike radioactive materials, can be handled without hazard and have wide application to product tagging, process tracing, and for studies on environmental or metabolic degradation in such diverse areas as pharmaceutical and pesticide R&D.

The company is still fairly small, under \$1 million in sales, but its business is growing rapidly. According to Alfred Ajami, one of

the founding partners, the company continues to rely on Harvard and MIT faculty consultants in the development and application of several of its product ideas.

Applicon, Incorporated

Applicon is one of the creators of the field of computer assisted design, or graphic processing. Graphic processing is analogous to data processing in the sense that it creates, manipulates, edits, and stores drawings and pictorial representations instead of numerical data and text. Graphic processing systems are used in a wide variety of engineering applications to replace manual drafting operations. The idea of computer assisted graphics was developed during the 1960's at a number of places, including most notably the Lincoln Laboratories of MIT. The four founders of Applicon were colleagues at Lincoln Labs, and left in 1969 to form this company.



Initially, Applicon used existing hardware and software components but, within two years, switched to a minicomputer, built by Digital Equipment Corporation, and began to manufacture its own components, such as plotting tables, input tables manipulated by an electronic pen, and a unique input keyboard. The company, with a gross sales for 1976 of about \$15 million, has a substantial domestic market and its annual rate of growth has been impressive, exceeding 50 percent growth or more each year from 1970 to 1974.

The key to the company's success has been its ability to translate new engineering ideas into cost saving business tools. Actual customer experience demonstrates that savings over manual drafting are as much as six to one. Essential to maintaining its competitive edge has been the recruitment of a highly skilled and sophisticated work force. The engineering staff is dominated by MIT graduates. Asked about the chances of the company relocating as the business expands and gets more complex, President Gary Hombuckle, himself a native of Kansas, says he sees no chance of this. “For our kind of company, with such a heavy reliance on topnotch technical people, this is and will continue to be the right place to be.”

Laser Analytics, Incorporated

Laser Analytics is the first company devoted exclusively to the application of tunable diode lasers. The basic diode technology the company is exploiting was developed at Lincoln Labs of MIT by Jack Butler, the current President of Laser Analytics. In January 1975, he and Ken Nill, another Ph.D. level scientist from the Labs left to found the company. Since then, the company has grown to a staff of 20, and expects to double in size by the end of 1977.

The main product lines are spectroscopic instruments based on the tunable diode laser. This laser was first developed in 1963, and by 1970 was being used for ultrahigh resolution spectral measurements. The company's present instrument has a resolution 100 to 1,000 times better than previous conventional instruments, and emits an intense, monochromatic infrared beam which can be varied in wavelength, or "tuned," by a simple adjustment. This flexibility has opened up entirely new areas of measurements to the scientist and engineer in infrared photochemistry, atmospheric studies, laser isotope separation, air pollution, and many other areas. Laser Analytics received the prestigious IR-100 award in 1976 for this development.



President Jack Butler attributes their success in part to "our continued interaction with the universities, which is necessary in order to keep on top of new happenings." In addition, he feels their location is instrumental to their continued growth.

"Laser Analytics carefully chose their location to be physically near Lincoln Labs. We could have gotten cheaper land out in New Hampshire; however, potential customers come to visit Lincoln Laboratories and it is natural to stop by here on the way.

This expands our potential market . . . in addition, related work is going on at Lincoln Labs . . . continued interaction is mutually rewarding to the growth of this technology, which is still in an evolving stage. . . . It is important to be in the midst of high technology industry."

Rheocast Corporation

In 1971, two MIT engineering professors discovered, almost by accident, that the properties of cast alloys could be significantly altered if they were vigorously agitated during solidification. Today, a small company, Rheocast, is building a new production technology on the basis of this discovery. (Rheocast is a trademark of the Rheocast Corporation.) The connecting link between these facts involves the work of the MIT



Development Foundation. After the initial discovery development of the Rheocasting process was funded by the Department of Defense in the area of aluminum alloys, and subsequently for steel alloys. When the commercial possibilities of this process for other metals became clearer, the MIT Development Foundation helped establish Rheocast as an independent commercial enterprise. Rheocast was granted an exclusive, limited term license from MIT for the basic process, with the right to negotiate sub-licensing arrangements with other companies.

Development of the Rheocast process is continuing with the cooperation of MIT and, on a contract basis, with other customers. Using the process the company can make castings that save as much as one-half of the material and one-half of the machining effort required by other casting processes.

Because of such savings there is much interest in the Rheocast process throughout the metal industry, and the growth of the company seems assured. In addition to job shop work, contract research, and licensing arrangements, Rheocast builds specialized equipment for other companies to make their own applications.

The initial spin-off from MIT and the continuing consulting relationship would seem to give sufficient reasons for Rheocast to stay in Massachusetts, but President Wendell Hess says it is other factors that really keep him here.

"I can call up (locally) and get anything I want. . . . There isn't another place in the country with the talent, industrial supplies, and technical know-how I can get here, and I mean places like Pittsburgh, Chicago, Houston, Los Angeles, where I've looked."

American Systems, Incorporated

American Systems was founded in 1969 by members of the Research Laboratory of Electronics at MIT. Their first efforts were in the development of a telecommunication system that would provide speech output. The system is fully integrated in a large application system with openended vocabularies.

It can produce both words and sentences. While the system can use teleprinters, CRTs, and other peripheral equipment, its main feature is its ability to use low-cost full keyboard input and voice output.



In 1971, the company installed the first of a national network of Audio Response Time Sharing (ARTS) service bureaus. This system consists of a speech and teleprocessing system coupled to an applications computer system. It is designed to accommodate the needs of the blind and physically handicapped by providing text editing and computational services for blind teachers, students, and programmers working from their home, school, or office, using only the ARTS 70 keyboard terminal coupled to their ordinary telephone. The handicapped users can obtain, in addition to voice response, fine quality print and braille copies of their information.

Since 1973, the company has manufactured and successfully marketed its voice response systems to major banks and retail organizations throughout the Eastern United States. In addition to "front ending" IBM 360/370 computers, ASI has installed major banking telecommunications networks which provide distributed data processing along with distributed voice response and terminal support.

American Systems' President, Dr. Kenneth R. Ingham, sees a future of continued expansion for the company as they branch out in new fields. This will be aided in part by the "concentration of talent to be found both within the academic community and the local presence of such major suppliers as Digital Equipment Corporation . . ."

Turning Knowledge Into Jobs



Knowledge is a growth industry in Massachusetts in two ways. The three universities pictured here—Harvard, M.I.T. and Boston University—alone employ 27,200. More importantly their research facilities have spun off hundreds of new companies in Massachusetts and trained thousands of entrepreneurs and managers. Shown here are just three outstanding examples.

Draper Laboratories has been a major research facility of M.I.T. for 40 years. In 1973, it became an independent R&D facility employing 1,800 people. In 1976, Draper did \$87,000,000 of business in military and

space development, particularly with inertial guidance systems. Through such other facilities as Lincoln Laboratory, the magnet laboratory and the energy laboratory, M.I.T. has spawned well over 300 new companies, including such giants as Digital Equipment Corporation.

The Damon Corporation is a major factor in clinical laboratories, medical instruments and pharmaceutical products, with 1976 sales of \$140 million and employment of 4,600. Although it was started as an engineering firm, it soon moved into the medical field. The management and staffing of the company draws heavily on the unparalleled medical research community in Greater

Boston. Shown here is the Harvard Medical School, one of the major parts of this community. Other notable members are Massachusetts General Hospital, probably the leading hospital research institution in the world, the Farber Cancer Institute for children's cancer, and the Children's Hospital. All are large employers in their own right.

In 1957, a group of Boston University engineers and physicists founded Itek Corporation to make high precision optical cameras. Itek now manufactures a broad range of optical goods and in 1976 had sales of \$208 million and employed 6,100.

The International Connection

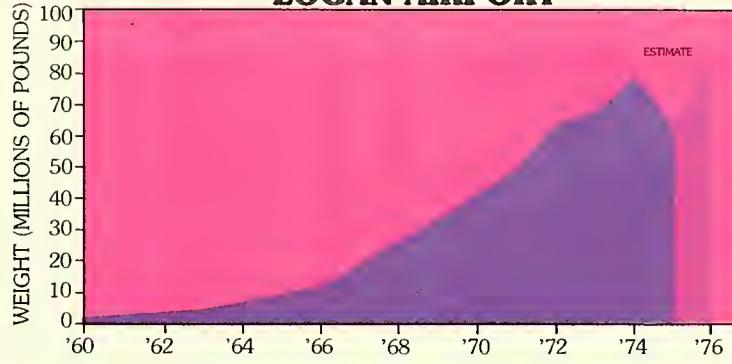
Exports of baleen and ambergris have decreased to zero, and New Bedford is no longer the whaling capital of the world, but Massachusetts is still a major center for international marketing and manufacturing. There are sound reasons for this. Our location and the quality of our air and sea transit facilities have always given us an edge in European trade. And our greatest resource — the innovation, talent, and enterprise of our people — has never been dependent on a specific product. For many years textiles and leather made up a large part of the foreign trade from Massachusetts' ports. The decline of these traditional industries has been more than offset in recent years by the increasing demand in world markets for high technology manufactured goods and high quality professional services.

One indicator of this, as shown in the graph, is the fact that since 1960 international air cargo shipments from Boston's Logan Airport have increased by about 4,000 percent. Another is seen in the second graph which shows that Massachusetts' export increase per business is 144 percent as compared to the U.S. rate of 86 percent, while Massachusetts' share of the total U.S. exports has remained about the same. This means that there are fewer Massachusetts' companies exporting now, but they are being much more successful.

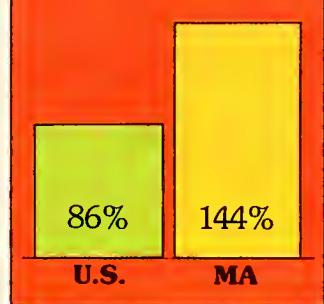
The bulk of these exports is in computers, electrical equipment, machinery, instruments, and control equipment. These are the same industries which were cited earlier as being among the high growth sectors of our economy, mainly because the same factors are involved. Wang Laboratories, for instance, which is a major factor in the minicomputer and word processing equipment industries, expects to do 2/3 of its business overseas in the near future. Some of the other major exporters are the Foxboro Company, which makes petroleum process control equipment; Honeywell, which makes computers; Polaroid, with cameras; Instrumentation Laboratory, makers of medical diagnosis equipment; USM Corporation, which makes 'hoe machinery; and Bose Corporation, makers of hi-fi equipment.



**INTERNATIONAL AIR CARGO SHIPMENTS
LOGAN AIRPORT**



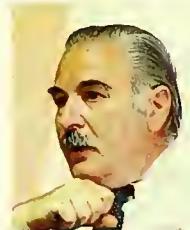
**GROWTH IN EXPORTS PER
BUSINESS ESTABLISHMENT
1960-1972**





In addition to the exports of hard goods, Massachusetts also has a number of pre-eminent service industries that do a thriving export business. The nature of many services is such that the real product is knowledge and expertise, so that the actual transfer can occur either in Massachusetts or abroad and still be considered an export. For example, some of the major medical facilities in Massachusetts are teaching facilities for the leading medical schools in the world, such as Harvard and Tufts. These and other medical facilities also have a constant stream of patients from around the world seeking their services. Each year, thousands of foreign students and scholars come to Massachusetts to take advantage of universities, medical schools, and research institutions such as Woods Hole Oceanographic Institute and Draper Laboratories in Cambridge.

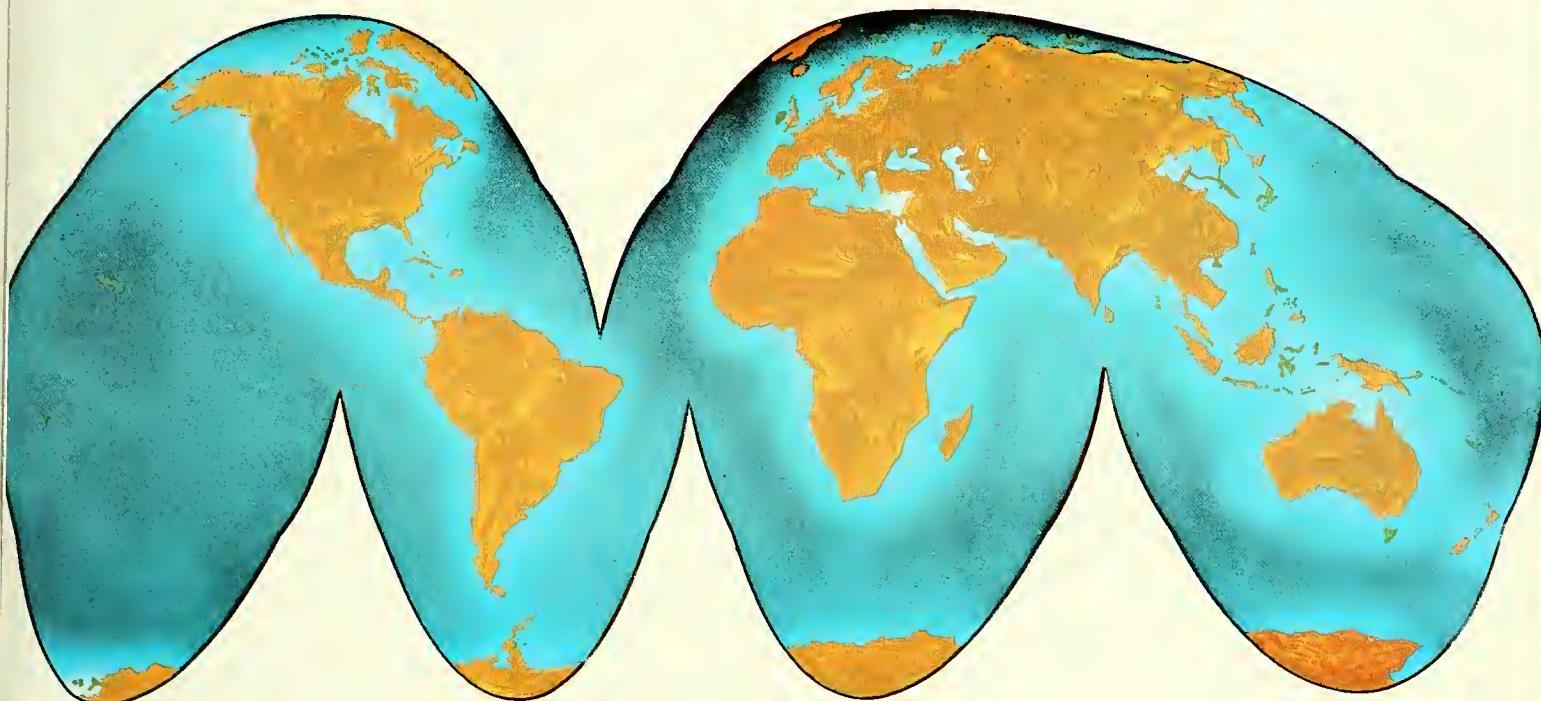
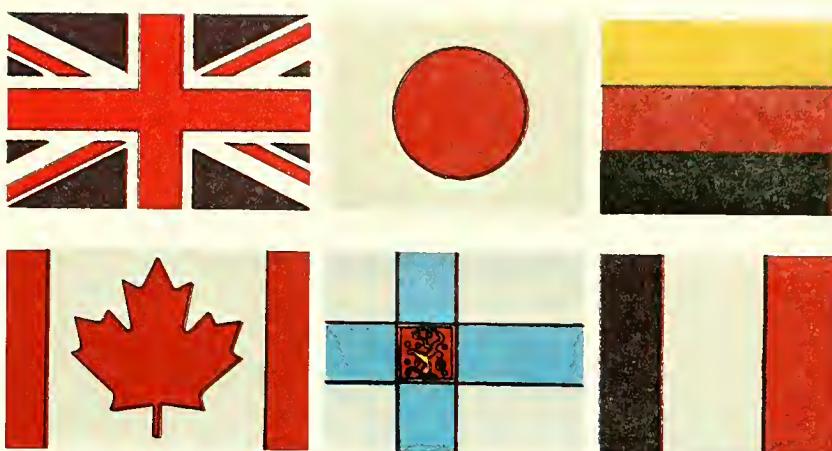
Massachusetts also sends much of its expertise overseas. Companies such as Sylvania and A.D. Little are currently doing hundreds of millions of dollars of business abroad in planning new industrial plants, creating new educational systems, and designing new health care facilities. William Morton, chairman of an organization providing training in marketing to managers and executives from other countries, put it succinctly. When asked why he located in Cambridge when his clientele comes from all over the world, he said:



"When you think of education, you think of Cambridge. It's as simple as that. If I want to attract foreigners to take our courses, this is the only place to be."

William Morton
International Marketing Institute

Many foreign investors have recognized Massachusetts' advantages, and are locating their facilities here, or are buying controlling interests in Massachusetts companies. Data current as of 1975 show between 80 and 90 foreign businesses or foreign controlled businesses in Massachusetts. Virtually all of this business interest is European and Japanese, with almost one third of it coming from the United Kingdom. To support these interests, as well as the export activities, a wide range of specialized support services has been created in Massachusetts. Among them are:



- *Boston's Logan Airport* has direct flights to over 200 foreign cities.
- *The Port of Boston* is served by steamship lines that visit almost 150 ports in over 50 countries.

— Over 50 countries maintain consulates in Boston, or about equal to Chicago, after New York, California, and Texas.

— *Boston banks* maintain numerous overseas offices and foreign correspondents. The largest Massachusetts bank, the First National Bank of Boston, for instance, has 64 branches or subsidiaries in 42 countries.





Enjoying Life in Massachusetts

We have discussed and examined a lot of aspects of the business and professional environment in Massachusetts, and now we would like to shift the emphasis to you and your family.

Are they going to like living here?

Activities that are enjoyable and important to some people are less important to others, which is as it should be. The major consider-

ation, however, is the availability of a full range of activities in the arts, cultural and recreational events. The numbers, diversity, and excellence form the basis for a state by state comparison, and are important when assessing the opportunity for enjoying life, particularly during one's leisure time. This part of life and its quality has to be an important consideration, because the facts are that the average person spends 84 per-

cent of his time in non-work related activities.

The availability of leisure time activities and the opportunity for family and individual enjoyment abounds in Massachusetts. We are going to tell you about some of them and a few of the people who are involved, and let you judge for yourself how Massachusetts ranks in the number, diversity and excellence of cultural and recreational events.

I happen to agree with Rossini, a very smart man, that all music is good except the boring kind. At a Pops Concert in Symphony Hall, people sit around tables and partake of food and a variety of beverages – there's even a pink lemonade that they call "Pops Punch."

For the first third of the program, we give out pretty solid musical fare. We follow with a soloist and some important orchestral numbers – and conclude with Broadway musicals – Strauss, Leroy Anderson and so on. It's like a meal. You get the soup and meat courses, and then you lighten up with dessert.

I have a particular fondness for Massachusetts – in Boston's Symphony Hall, at the Hatch Shell along the Charles River on a warm evening, and at beautiful Tanglewood in the Berkshires of Western Massachusetts. There is a quality about Massachusetts, a musical response in its people, that is a very rewarding experience.

Also, it is a tradition that Boston Symphony conductors can do exactly what they please. If you want to go out on a limb and hang yourself, that's all right, too."

Arthur Fiedler, Boston Symphony Orchestra



All my life I have loved to watch people. It is said that my pictures are typical of American life. If that is true, it is natural, for I have lived the greater part of my life in America, and I am glad, because I have painted to the best of my ability from just what I see around me.

When fate brought me to Stockbridge, I soon found it a good place to live. From its beginning as an Indian Mission, the marks of its growth show in its streets, its buildings, its institutions and its ways. Most important to me are its people. The town is big enough to have a great variety, they are friendly and cooperative, and when I need a model, I can nearly always find one right here.

When I and my eyes need a rest from close work in the studio, a few minutes can get me away from hurry and bustle. The back roads wind through range after range of high wooded hills, affectionately named as mountains, and between gently sloping fields that reflect the seasons from seedtime to harvest, and all the moods of our wilful winters. Here strains and worries tend to lose themselves.

For all these reasons, I have learned to love Stockbridge, in the Berkshire Country of Massachusetts.

Norman Rockwell, Artist

Generations before Doctor Robert Goddard launched the world's first liquid fuel rocket, at Auburn, Massachusetts in 1926, and space exploration terms became so commonplace in our language, Massachusetts was, and is today, a "launching pad."

Our nation's earliest settlers, whose roots sprang from Massachusetts, learned to use not only their hands, but their brains as well, when confronted with the harsh realities of the new world. Craftsmanship and ingenuity are still among our most valuable natural resources.

Massachusetts has always ranked high in America's subjective assessment. It is viewed as the place where America began – geographically, politically, artistically, and technologically.

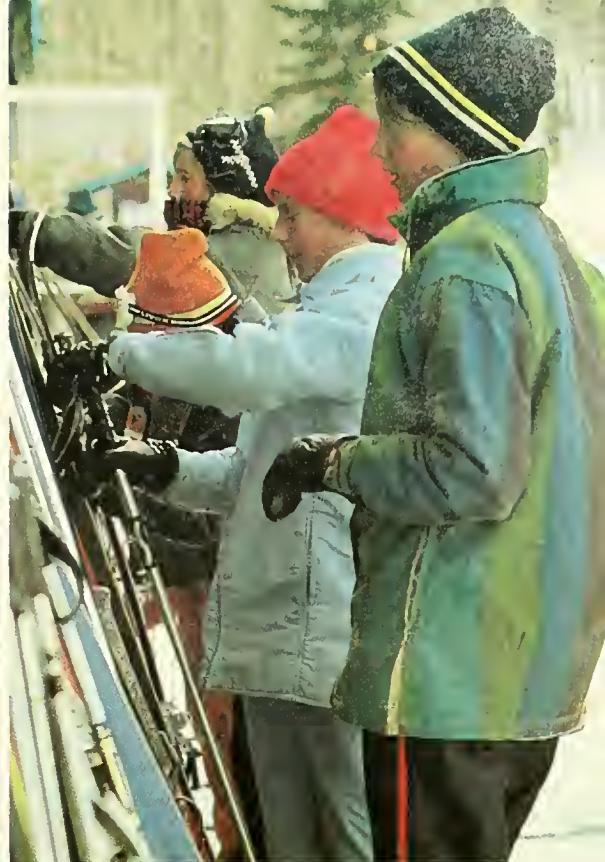
From my boyhood days in Boston's West End to today, the awareness of Massachusetts' continuing contribution to our nation's well-being has been a positive influence on me and a source of pride about my home state."

Leonard Nimoy, TV and movie star



As to why we chose to live here, in spite of the climate we love the area and the people and we find it a most stimulating place to be. Although we have lived all over the world, we wouldn't think of having permanent residence anywhere else than right here in New England, and especially in the Boston-Cambridge area.

Julia Child, Cambridge, Massachusetts Chef, author and TV personality





The Quality of Life



Quality of life is a large topic, and, in many ways, a subjective one. While we rate this quality very highly in Massachusetts, we do not subscribe to the view that the quality of life, in and of itself, is the major consideration in a business firm's relocation decision. Although the principal factor is, "Where is the most profitable location?", there is a balance that is best expressed in the words of Vernon R. Alden, Board Chairman of The Boston Company, and Chairman of the Massachusetts Council on the Arts and Humanities:

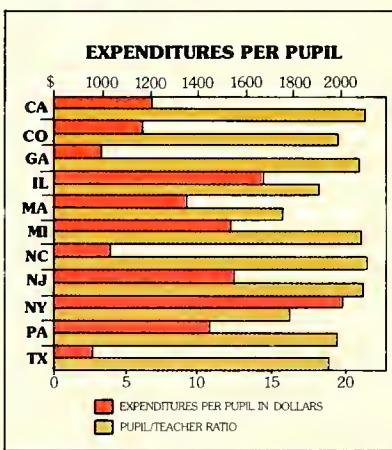
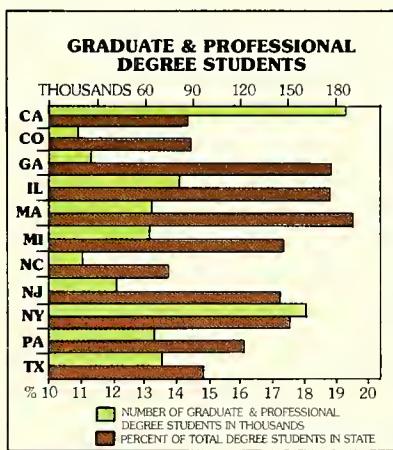
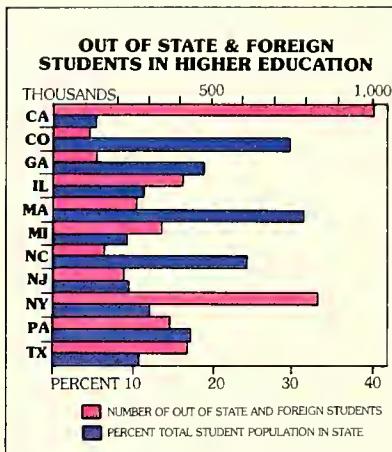
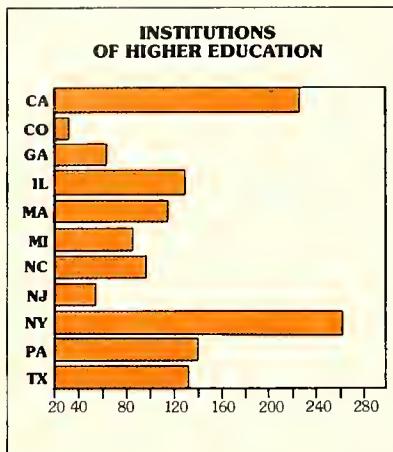
"One of our greatest needs in Massachusetts is jobs—to hold the industries we now have and to attract new companies to the Commonwealth.

Top level executives and middle management look carefully at what life will be like in the next town before they are willing to pick up their families and move on. A state's cultural environment—the quality of its musical organizations, its museums, its theatres—are among the most important considerations in keeping and attracting industry."

In Mr. Alden's view, when an exceptional quality of life is a factor, we have the edge. "Our artistic and cultural assets are a major economic advantage. Massachusetts, with something like 2 percent of the nation's population, has about 13 percent of its artistic and cultural resources."

In keeping with our main purpose, we wish to present an objective evaluation of some of the major elements that make up quality of life and still convey the richness and variety of our total environment for living.





Education

The quality and availability of educational opportunities in Massachusetts are without equal. We have 120 institutions of higher education. Among the more prominent of these are Amherst, Smith, Mount Holyoke, Harvard, MIT, Boston University, Tufts, Boston College, Holy Cross, Springfield College, Simmons, Northeastern University, Brandeis, and Wellesley to mention a few. The excellence of these is such that, as the chart shows, they attract a higher percentage of out-of-state and foreign students than any other state. As also can be seen in the chart, in 1974 there were higher proportion than in any other state. And, in fact, seven of the state's universities alone grant 10 percent of the nation's advanced degrees.

Throughout these pages we have often stressed our educational system, and this is because education touches almost every part of life in Massachusetts. We are justly proud of our schools.

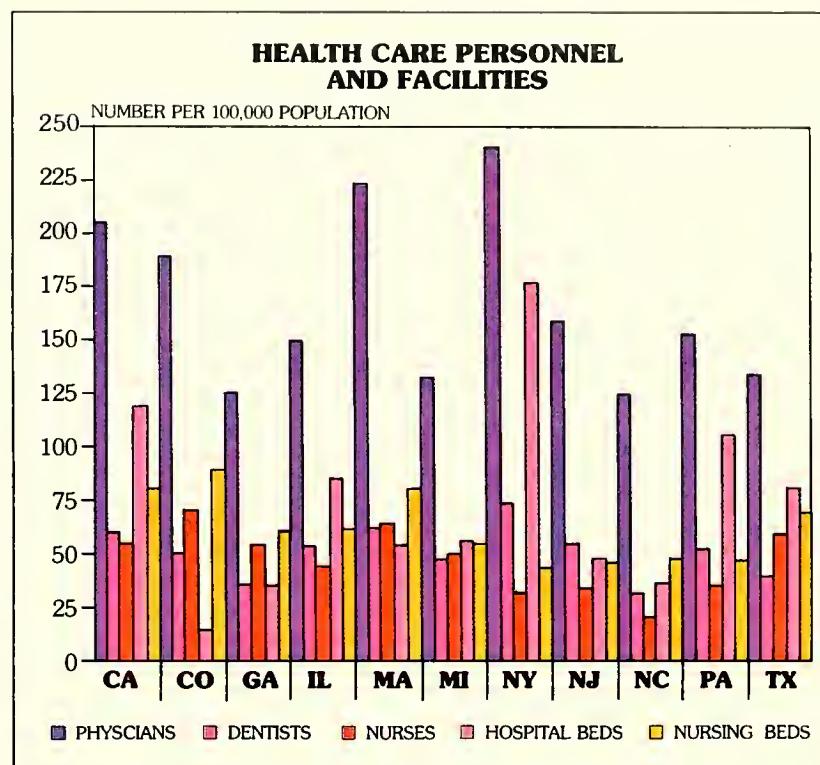
Elementary and secondary schools are all under local control, rather than a centralized state control. One of the consequences of this is that the quality varies depending on the interest of the community, but it also enables people who are interested to work at their local school system and make it as good as they want it to be. The evidence for this can be seen in the fact that, overall, as the charts show, we have the best pupil to teacher ratio of any of the eleven states, and rank fifth in expenditures per pupil. We also have some of the best private secondary schools in the country. A few examples of these are shown, some of the others are Governor Dummer, Concord Academy, Groton, Deerfield, Saint Mark's, Pingree and Dana Hall.

Health

Massachusetts has a unique concentration of leading medical centers, health care facilities, and research and teaching institutions. The tables show that Massachusetts consistently ranks high in the per capita number of physicians, dentists, hospital beds, nurses, and nursing homes. But these figures do not tell the whole story. The reputation of Massachusetts' great teaching hospitals and research facilities attracts the best talent in the world, which in turn adds to their resources and increases their reputation.

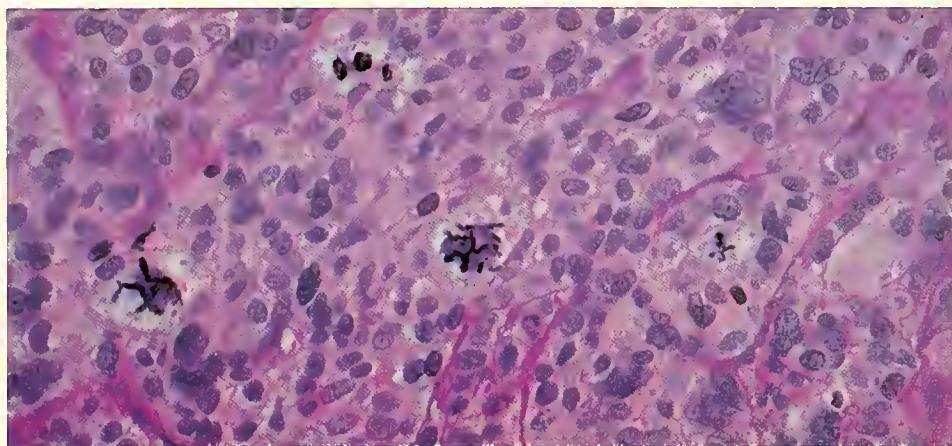
This reputation has been earned by dedication and painstaking effort down through the years. Breakthroughs in polio prevention, kidney transplants, oral contraception, smallpox inoculation, and surgical anesthesia did not "just happen" first in Massachusetts. Nor did the thousands of other advances and developments.

Research, which brought about these advances and is most newsworthy, is only one part of Massachusetts' medical excellence. Another part is the high quality medical education which brings students from all over the world to Harvard Medical School, Boston University School of Medicine, and Tufts University School of Medicine. There is a long-standing tradition of medical excellence here that will perhaps lead the way to an even better tomorrow.



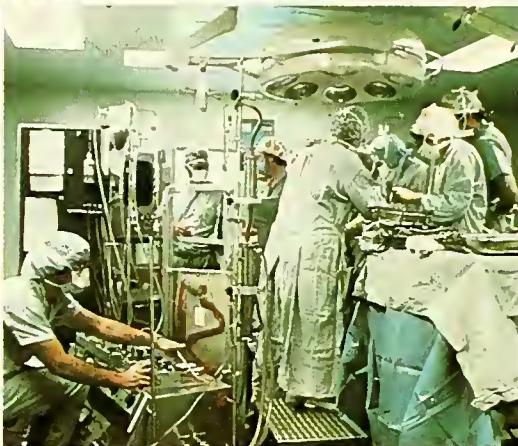
"The roots of the Massachusetts Eye and Ear Infirmary are deep in Boston's history. From its origins as a walk-up charitable clinic 151 years ago, the Infirmary has maintained close associations with other renowned health-care and educational institutions in the area. In the late 1960's, we chose to build our new hospital above and around the building we've occupied since 1899, continuing to serve the community around us and to draw on the great scientific and human resources that make Boston and Massachusetts so justly famous."

Charles T. Wood
Director, Mass. Eye & Ear Infirmary





The Lahey Clinic Foundation is a nonprofit health care institution founded by Dr. Frank Howard Lahey in 1923. The clinic is a comprehensive diagnostic and treatment center with a staff of 120 physicians covering 18 specialties dedicated to the concept of team consultants to care for the total person.



Massachusetts General Hospital is the original teaching hospital of the Harvard Medical School, receiving its charter of incorporation in 1811. The oldest voluntary, nonprofit hospital in New England and the third oldest in the United States, MGH has maintained its original purposes of high quality patient care, medical education, and research into the causes, control, and cure of disease.



Massachusetts Eye and Ear Infirmary was founded in 1824 as a pioneering undertaking to provide medical services for eye and ear disorders to the thousands of poor and immigrants in Boston for whom such services had never been available. Since 1869 it has been associated with the Harvard Medical School, and the infirmary is now one of the world's leading centers for such complex procedures as cornea transplants, replacing inner ear bones, and rebuilding larynges (voice boxes), in addition to carrying on major research efforts.

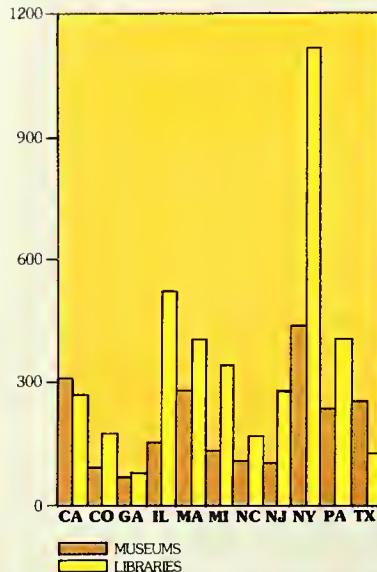
Community Life

From the large metropolitan areas of Boston, Springfield and Worcester to the smallest rural village, Massachusetts communities cover a wide range of lifestyles. Community life is many different things to different people, and it is impossible to quantify objectively. The important point, and the one we wish to convey, is that there is a great number and variety of nice communities in Massachusetts to fit almost every taste, plus they are easy to get to.

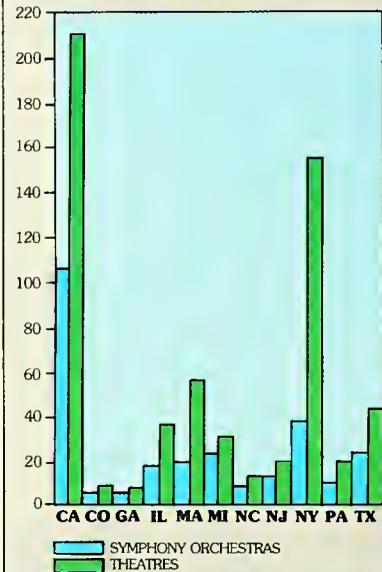
One of the things that makes a community a good place to live is the easy accessibility to public services, recreational opportunities, or cultural attractions. Our smaller size and excellent transportation system combine to make this possible. Another important factor is the interest the citizens take in their own community life. This is best shown in the fact that at least one Massachusetts city or town regularly gets an award from the National Municipal League as an "All-America City." This award recognizes community improvement through citizen action. In 1970 the award went to Fitchburg, in 1971 to Lowell, in 1972 to Somerville, in 1973 to North Adams, and in 1974 to Fall River.



MUSEUMS & LIBRARIES



ORCHESTRAS & THEATRES



Leisure Time



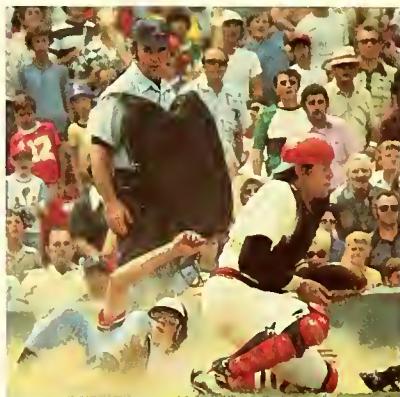
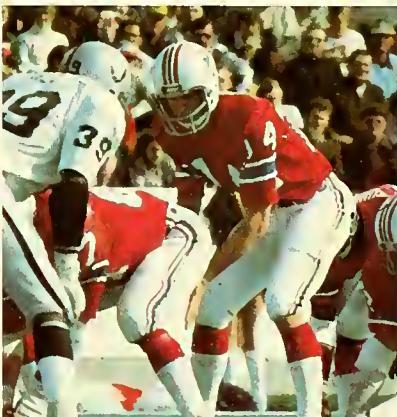
"Boston is a state of mind with endless fascinations that can never be fully explored. Its music, its paintings, its books, its universities and hospitals, its wonderfully funny little shops and restaurants, and most of all, the variety of interesting and interested people – the scientists and doctors and teachers and artists – keep it forever fresh and surprising."

Sarah Caldwell
Artistic Director,
Opera Company of Boston

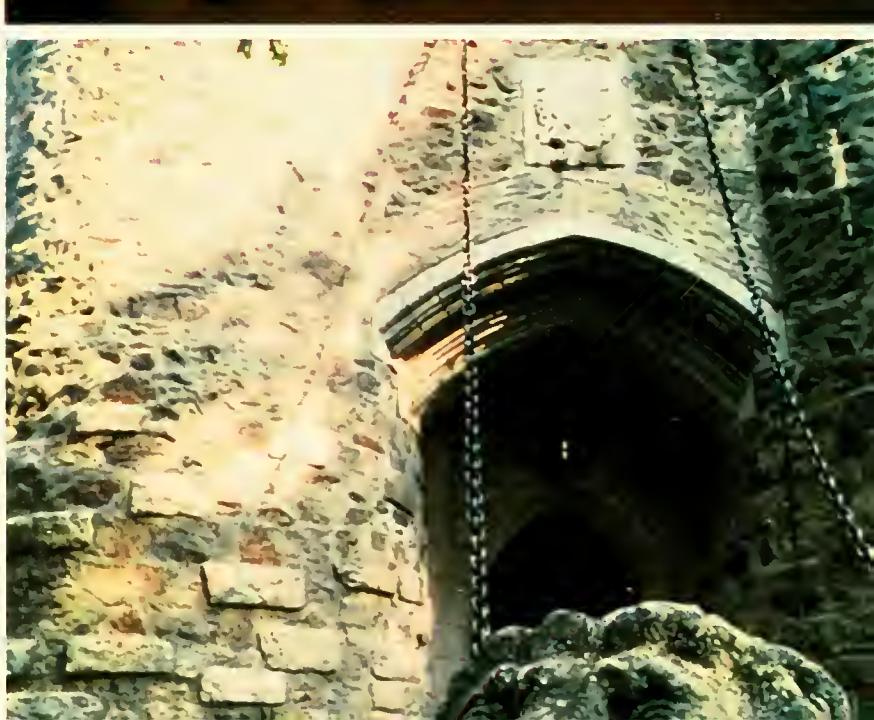
Leisure time activities is another subject on which each individual has his own interpretation and ideas, and to which we cannot begin to do justice. The charts here give a comparison of some of the various facilities and institutions across the eleven states. The first shows museums and libraries, and the second compares the number of orchestras, opera companies, and theater groups. Among the best known of these Massachusetts counts the Symphony Hall, the Museum of Fine Arts, the Museum of Science, Higgins Armory Museum, the Clark Art Institute, Boston Ballet, Boston Public Library; and many, many others. But the facilities themselves are really secondary to the events that go on there, some of which we have tried to capture in photographs.

For the sports minded, some of the best athletic clubs and professional teams in the world are found in Massachusetts. Football, basketball, baseball, tennis, and hockey are the biggest spectator sports and have a very strong following in the area. Since these are all Major League teams, they also draw fans and supporters from throughout New England.

There are other events of a number, variety, and quality to suit every taste. Boston alone has over 10,000 cultural events a year as listed in the *Boston Globe Calendar*. These include theater, concerts, exhibits, and children's programs. For example, you can see a great many Broadway productions in "try-out" before the New Yorkers do. Also there are a number of special events, unique to the Boston area, as shown in these photographs.





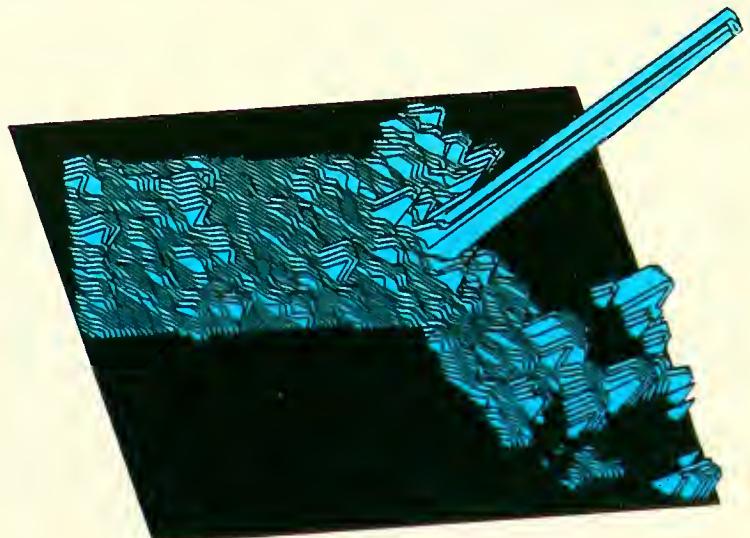




Citizens of Massachusetts are visibly interested in current events, as attested to by the excellent media coverage available here. There are 248 newspapers with a circulation of over three and one-half million, giving us the second highest circulation per capita in the nation. We also have ten television stations and 102 radio stations.

Massachusetts abounds with historical sites, tourist attractions, and beautiful scenery. From the Berkshires in the west to the shore at Cape Cod, you are never more than a few miles from something interesting to see. Since it is impossible to show more than a few of these in photographs, we have reproduced a computer map showing their distributions across the state. Produced by the Harvard Laboratory for Computer Graphics and Spatial Analysis, this map is a simple example of a new area of computer application. The technology makes it possible to display enormous and unmanageable amounts of printed data in a quickly recognizable and understandable visual form. In the late 1960's Harvard began developing the basic computer programs and techniques of graphic display of spatial data. More recent developments allow other kinds of visual displays and manipulations, such as directly on cathode ray tubes, and interactive graphics.

As in other areas of technological growth, this new field demonstrates the close relationship between the university and business. Because of the activities at Harvard's computer lab and MIT's Lincoln Labs, Massachusetts has, overnight, become the world's center for computer graphics.



Conclusion

Can you grow in Massachusetts? Your company's growth, your family's growth, and your own growth as a professional depend on a subtle combination of elements. Our research has shown that all these elements are available to residents of Massachusetts. Among them are:

- A professional and corporate community in which high technology and innovation are a way of life.
- Educational institutions that are the prototype of excellence.
- Access to transportation facilities the equal of any metropolitan area's.
- An abundance and variety of cultural and recreational attractions within easy reach and to suit every taste.
- A skilled and industrious work force.

Such advantages are important — important to you, and important to us. Massachusetts is not an inexpensive state in which to live. But it is a high quality state, and quality always costs more. Invariably, it is the best investment for the long term.

This publication has served its purpose if you now have a perspective on Massachusetts. A perspective on the type of people, and families, and companies who grow here. A perspective on what it takes to make a state great. A perspective on the interaction between individual growth and collective growth. To continue to grow and prosper, we need people who can take advantage of the benefits we offer, and who can, in turn, give us the benefit of their skills and talents. Yes, we are selling Massachusetts. But what we are buying is you.

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